MAXIMUMPC Presents The Ultimate...

# 3D GAMING TECH GUIDE

SPECIAL ISSUE FALL 2004

## GAME ENGINES Exposed!

**EVERY TECH DETAIL ON WHAT MAKES HALF-LIFE 2 & DOOM 3 LOOK SO DAMN GOOD!**

***ALSO:***
***An exclusive look at the next Unreal Engine—info, screens, & movie!***

***PLUS:***
*Expert tips for making Doom 3 run faster!*

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*We reveal the fastest hardware for playing **ALL** the latest 3D Games*

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PLUS 32 BRUTALLY HONEST 3D GAME REVIEWS, INCLUDING DOOM 3!

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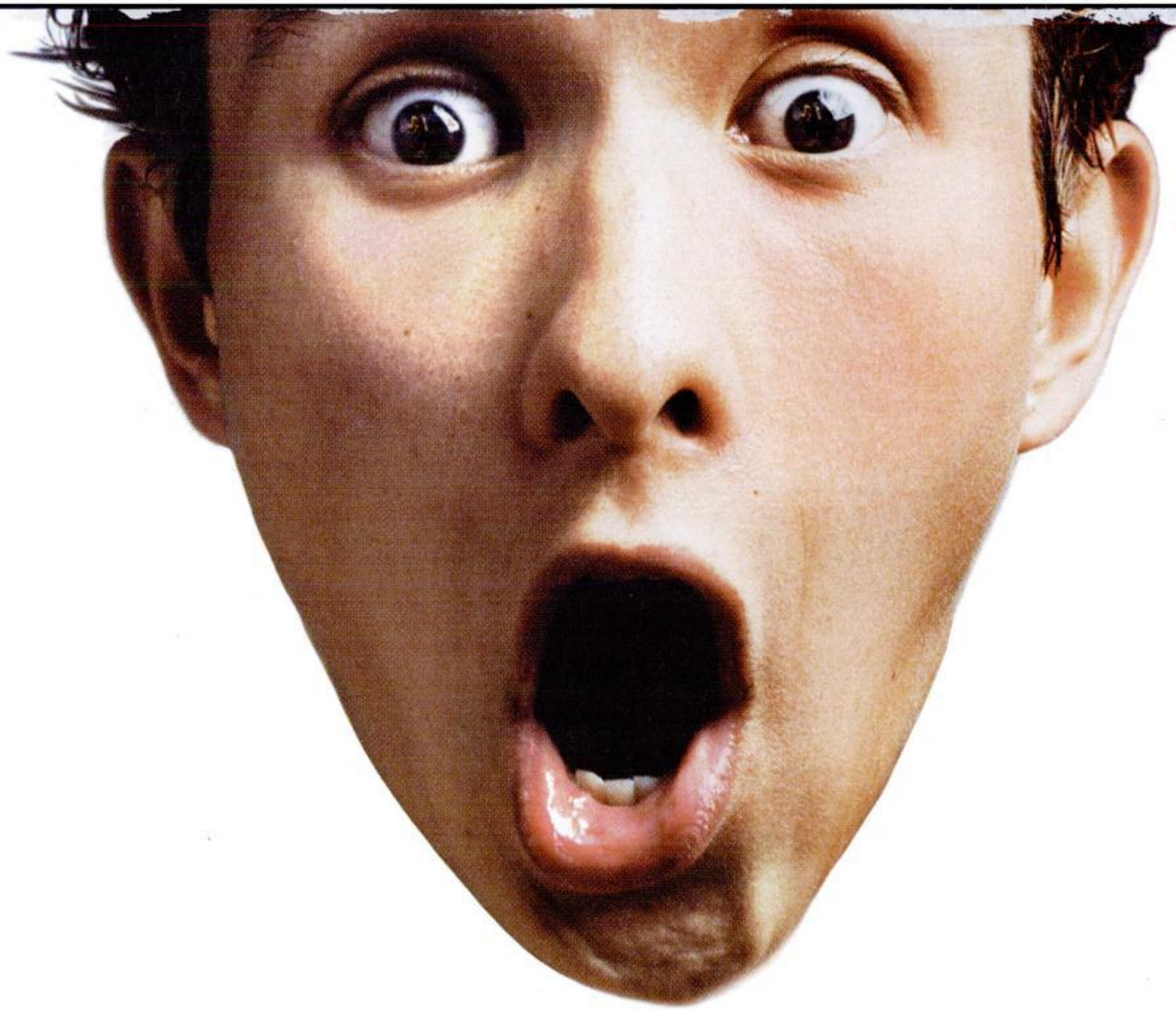

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*"Handled the Rigors of DOOM3 Without Issue"*
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*"10 out of 10"*
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**Steamed Turtle**

*"The Golden Bear & 9/10"*
**Bjorn3D**

*"Delivers on its Promise"*
**Adrian's Rojakpot**

*"Unbeatable"*
**3D GameMan**

*"Best of all Worlds"*
**Byte Sector**

*"Looks Damn Cool"*
**SystemCooling**

*"A Perfect 10"*
**DreamStation**

*"Fastest DDR400 on the Planet"*
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*"A Low Latency Demon"*
**Sudhian**

*"A Huge Achievement... Editor's Choice"*
**OcPrices Hardware**

*"Wow... Editor's Choice"*
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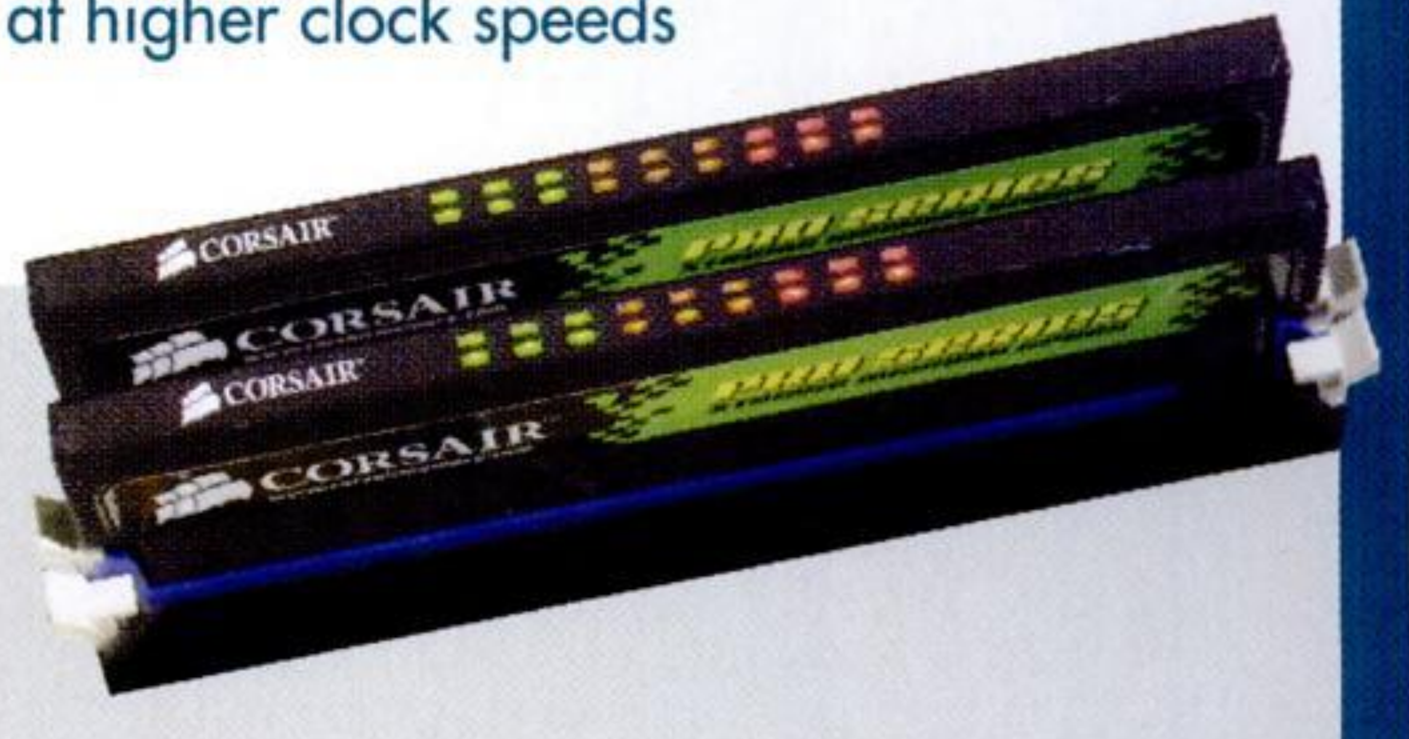
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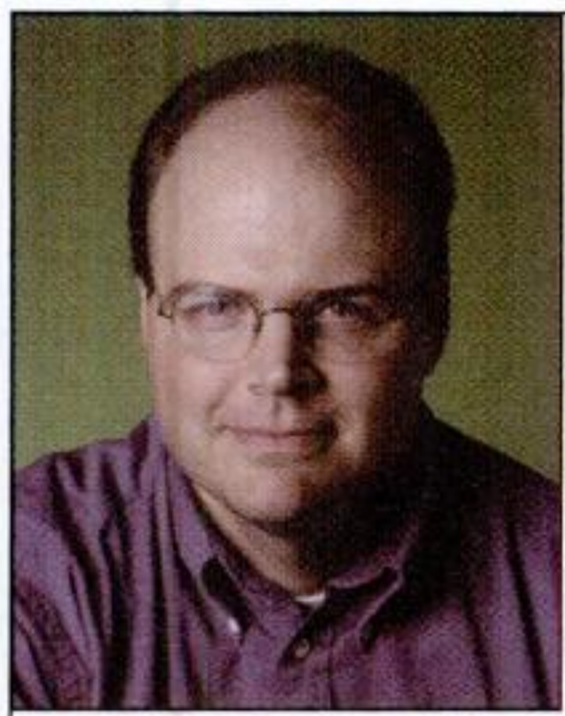


## Release Notes

# The Great 3D Tech Race

When it comes to the world of gaming, there is perhaps no more of a symbiotic relationship than the one that exists between 3D video hardware and the 3D games. With each generation of silicon and software, each pushes the other to up its ante in technological prowess.

This cycle is continuing to evolve, with each side of the coin leap-frogging the other, ultimately resulting in more rewarding entertainment experiences for us—experiences that come ever closer to justifying the almost obscene amounts of time and money we spend ensuring our PCs are equipped to handle new games.

If you're like the editors of Maximum PC, when a game as big and as technically ambitious as *Doom 3* arrives and maxes out the capabilities of your current videocard and CPU, you don't mourn your PC's passing. Hopefully, you rejoice over the fact that software has finally arrived that can push your hardware to its limits—and beyond. In our minds, *Doom 3* has provided us with an undisputable excuse to tinker some more with our PCs and investigate appropriate upgrades. That's exciting.

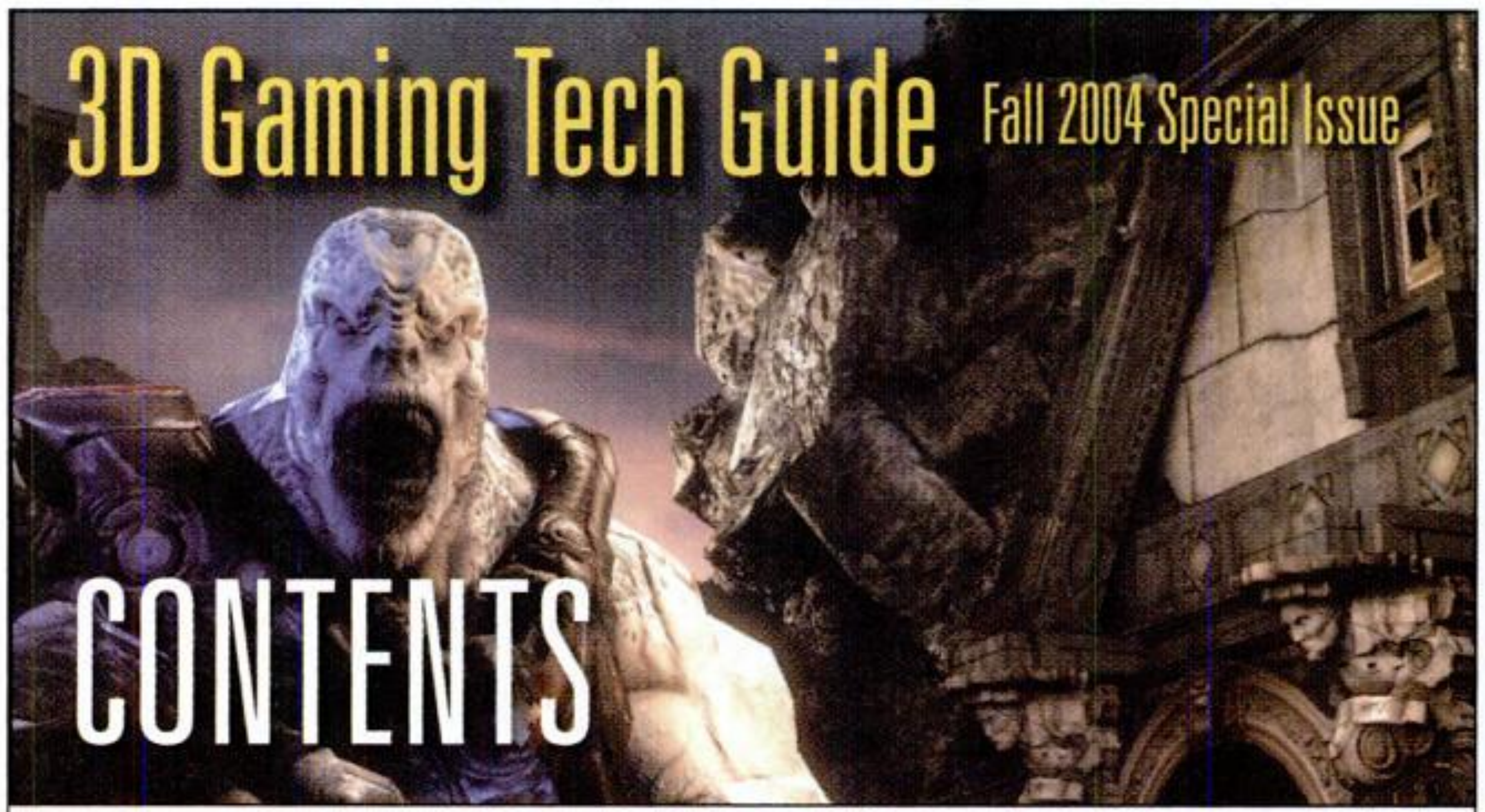
With *Doom 3's* arrival, *Half-Life 2's* imminent release, and the awesome potential of Epic's Unreal Engine 3 looming on the horizon, we are clearly entering the next revolution of the 3D hardware and software cycle. When ATI and nVidia released their next-gen graphics hardware, there was initially little need—other than bragging rights—to buy the new videocards. This is no longer the case. Turn to our in-depth game engine feature on page 48 for all the evidence you need. Trust me—you won't see this story *anywhere* else.

So, the next-generation of game engines are here, and they're dealing roundhouses to our previously "over-powered" hardware. What does this mean for you? To run these games at anywhere close to intended performance levels, you're probably going to have to upgrade. This could mean buying a new videocard or maybe a new system.

It's equally important to not overlook the "little things." Advances in 3D audio have made owning a quality 5.1 or even 7.1 soundcard and speaker system an equally vital component of a kick-ass gaming system.

There's a lot to consider, and there's no need to sweat it. In your hands you hold the guide that will show you *all* the answers. Every piece of hardware described in the following pages has "can't miss" potential for delivering the 3D goods. It's time to turn the page and start having some *fun*.

*—Steve Klett*
*sklett@maximumpc.com*



# 3D Gaming Tech Guide

Fall 2004 Special Issue

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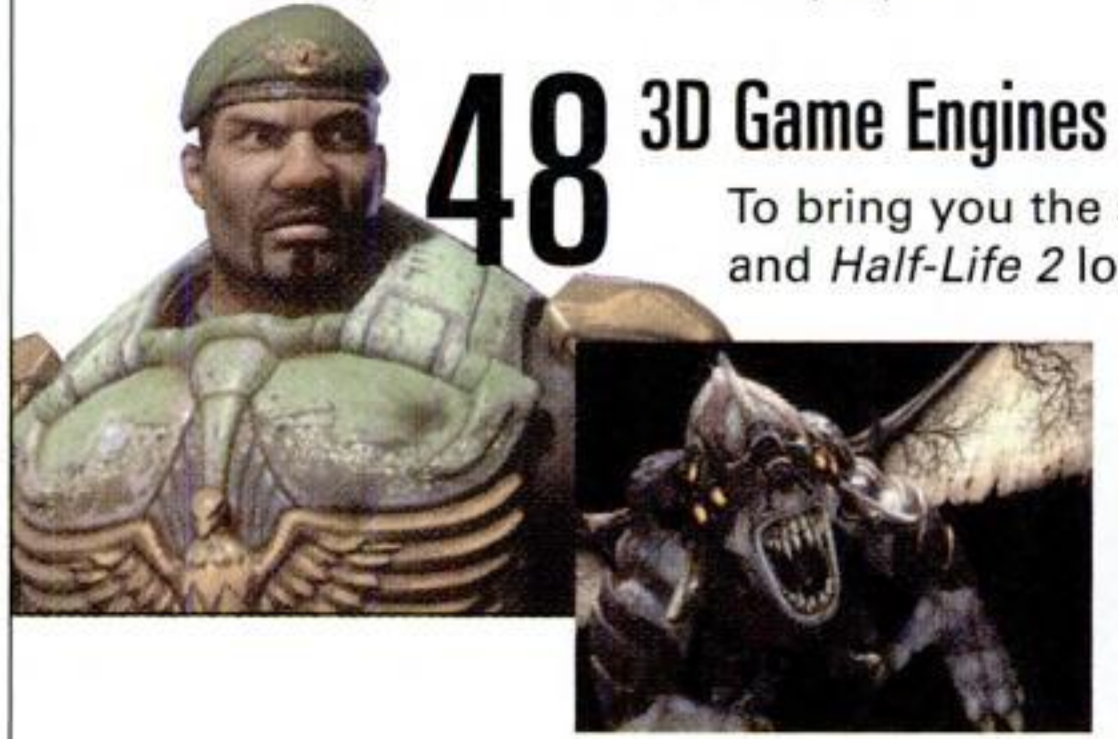
The *Maximum PC* experts identify the Top Ten titles that *must* be on your hard drive this holiday season.

## 26 Hardcore Hardware

We showcase the most game-worthy desktops, laptops, monitors, LCDs, videocards, mice, and speakers. And we give you the low-down on the current state of the CPU race. Make sure you are properly equipped to play all the latest-and-greatest 3D games as they were *meant* to be played.



## 48 3D Game Engines Exposed

To bring you the skinny on why *Doom 3* and *Half-Life 2* look—and play—so damn good, *Maximum PC* dives under their hoods to see what makes them tick. And we bring you an exclusive sneak peak of the 3D future according to Epic's Unreal Engine 3.

## 68 3D Year In Review

Having trouble deciding what game to buy next? This complete catalog of *every* 3D game *Maximum PC's* reviewed thus far this year will help.

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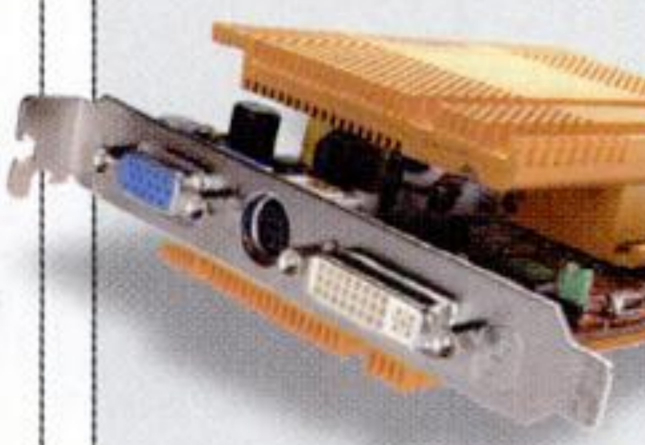
The *Maximum PC* staff leverages its 50-plus years of collective gaming experience to identify The Top Ten 3D Games of All Time.

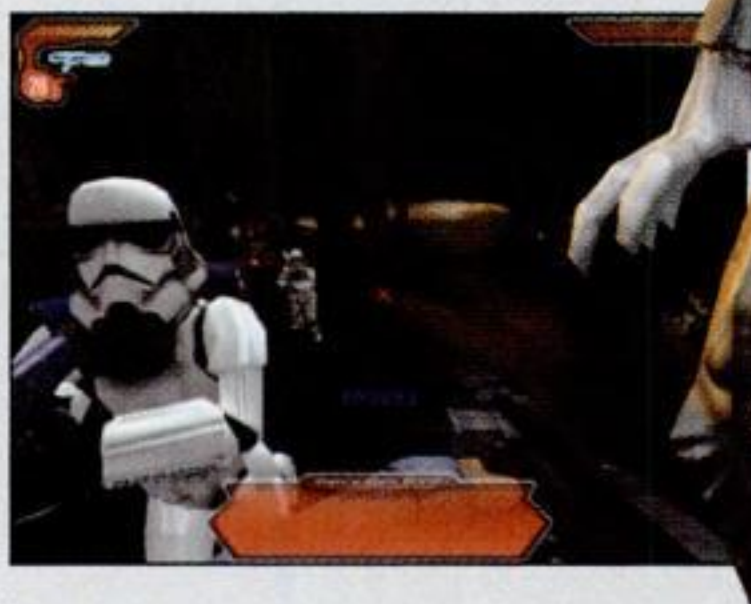


## 90 How to...

Completely silence your PC and sculpt your air-flow for optimal cooling prowess.

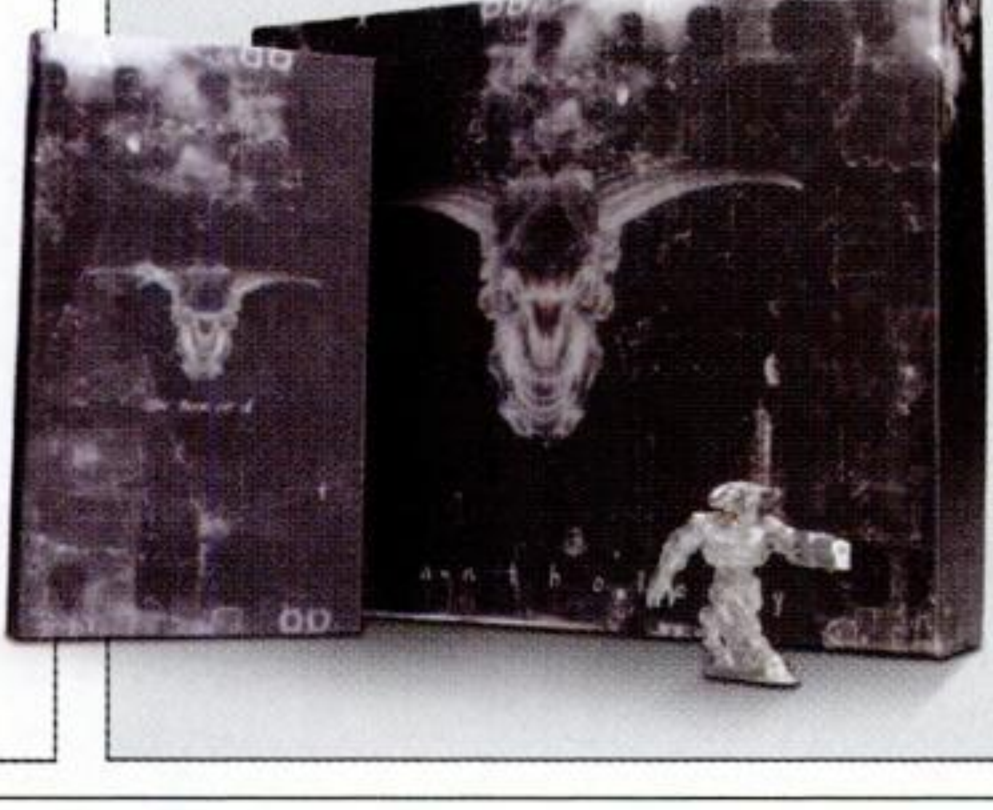
## 94 Doom 3 Technical Q&A

From the mouths of its makers, we bring you in-depth details on how the *Doom 3* engine works. And we provide advice on how to tweak the game to run faster on your PC.



## 101 The Best 3D Game Mods

Give your games a free makeover, courtesy of these incredibly fun-filled user-created modifications.



## 104 Collectible 3D Games

Who knew? Old games can be worth big money. We take a look at couple of the most valuable game compilations in existence.

WING COMMANDER
KILRATHI SAGA

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# ON THE DVD

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FALL 2004 SPECIAL ISSUE
Unreal 3 Engine
Exclusive Movie!

## 2 Complete Games, 6 HUGE Demos, 3 Marvelous Movies, and More!

In the ultimate try-before-you-buy exclusive, *Maximum PC* brings you the FULL 2GB version of *Star Wars Galaxies: An Empire Divided*. You can take this popular online role-playing game on a 14-day test-drive, at absolutely no charge to you! We repeat: That's up to two weeks of online *Star Wars* gaming goodness for you to enjoy—for FREE! (For details on the free-trial program, see story on the right.)

### Start Playing!

To get started playing the free trial, just follow these six incredibly easy steps:

**Step 1:** Install *Star Wars Galaxies: An Empire Divided* from the *Maximum DVD*.

**Step 2:** Go to http://www.station.com and create a Station.com account (create a username and password). Input and activate the free-trial account-key, which you will find on the back of the DVD sleeve. Note: the 14-day free-trial period begins when the free-trial account-key is activated.

**Step 3:** Launch *Star Wars Galaxies: An Empire Divided* and log in with your Station.com username and password.

**Step 4:** Click on Play to start playing *Star Wars Galaxies: An Empire Divided*.

**Step 5:** Choose your game server. (Be sure to check with your friends to find out which game server they are playing on first, as characters cannot be transferred between servers.)

**Step 6:** Create and customize your very own *Star Wars* character and start playing the new-player tutorial. Hint: Talk to your new-player-helper droid whenever you need a hint or advice about playing the game.

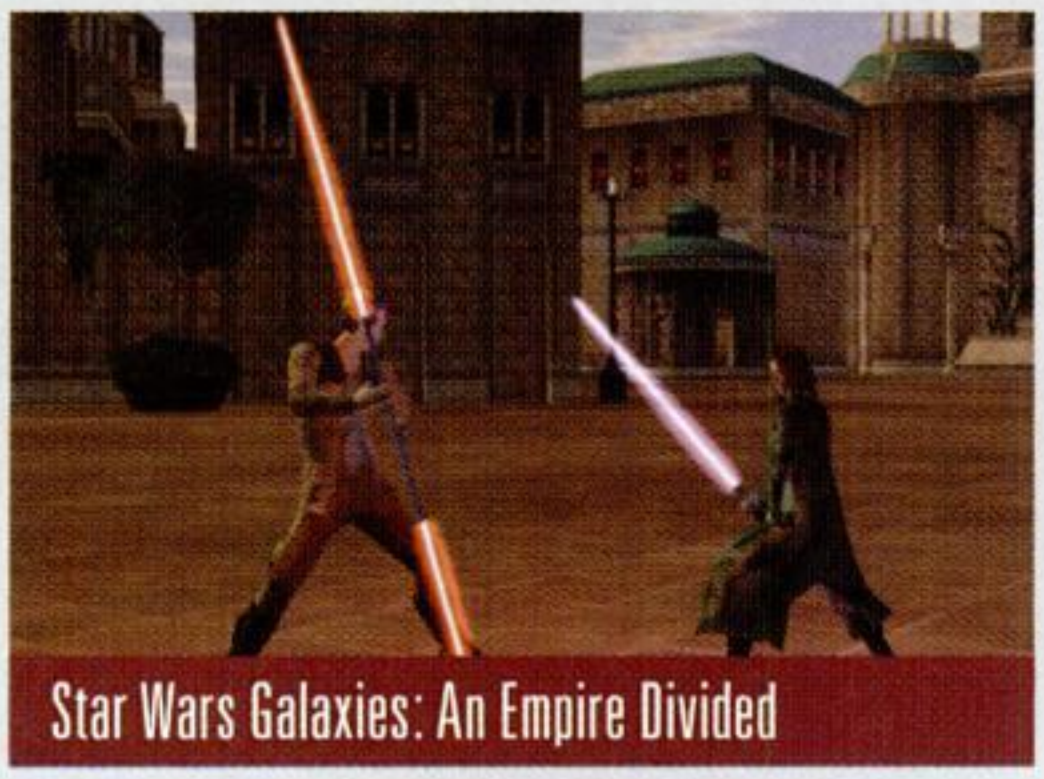
Enjoy your time in the *Star Wars* universe!

If you need technical support with *Star Wars Galaxies* specifically, please visit the *Star Wars Galaxies* Support Page at: http://starwarsgalaxies.station.sony.com/

### Galaxies Free-Trial Details

Once you have activated the free-trial account-key, you will then be able to play *Star Wars Galaxies: An Empire Divided* for up to 14 days—at no charge. You must activate your free-trial account-key on or before 11:59 p.m. (PST) on January 15, 2005 or you will not be eligible to participate in the trial program. An Internet connection is required to play the game. The game is intended for play only within North America and Europe. In order to continue playing the game, you will need to buy a copy of the game at a retail or online store and activate the retail account-key. Activating the retail account-key terminates the trial period. A valid credit card or paid game card (if available) is required to activate the retail account-key, and additional recurring fees are then required to play the game. Once you activate the retail account-key, you will be able to access the same character—and its assets—that you played during the free-trial period. Other terms and conditions must be accepted to activate the retail account-key and then play the game.

## FULL GAMES

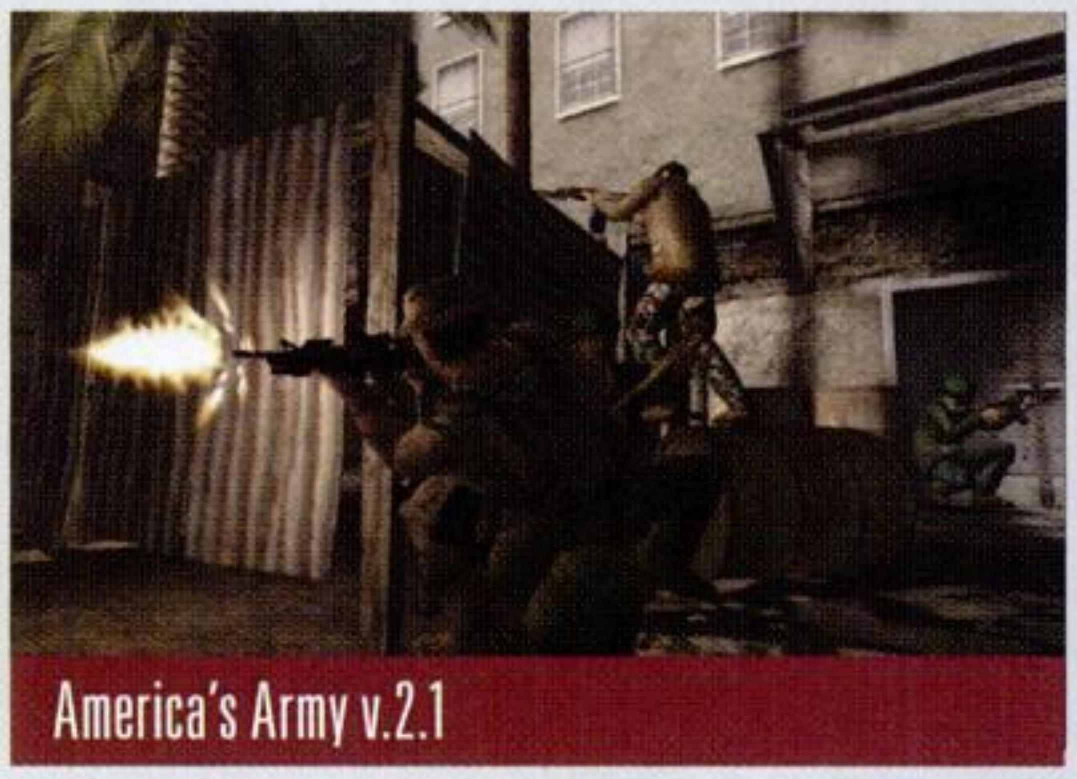


Star Wars Galaxies: An Empire Divided

### Star Wars Galaxies: An Empire Divided

### America's Army v.2.1

Ten hut! This totally free game from the Department of Defense is the closest thing to combat this side of enlisting! Go through training, join your team, and kick some butt!



America's Army v.2.1

## GAME DEMOS

### Far Cry

First-person shooters don't get much better than this. *Far Cry* has incredible graphics, pulse-pounding gameplay, and unbelievably realistic 3D environments. This single-player demo requires you to battle your way to the top of the mountain to take out the communications satellite dish—the enemies are extremely intelligent, so proceed with caution!

Far Cry

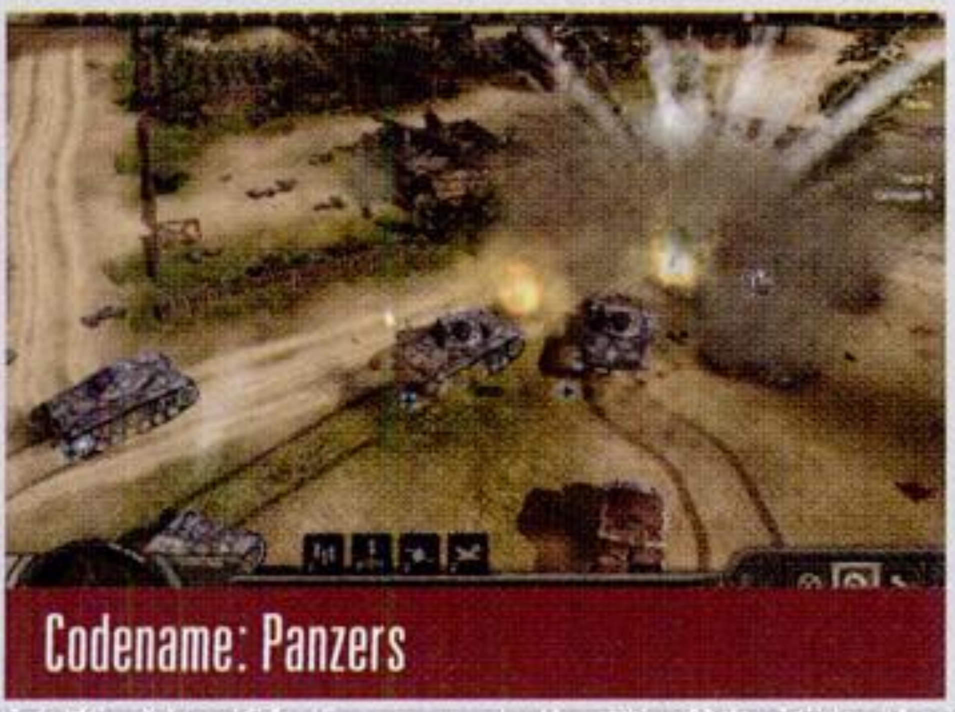
### Unreal Tournament 2004

*UT* is back with a vengeance and is better than ever! This awesome demo includes five maps and six game modes for hours of fragging goodness! Be sure to check out the all-new Onslaught game, where opposing teams battle for control of "nodes" before bringing the battle to the enemies' home base!

Unreal Tournament 2004

### Codename: Panzers

This awesome real-time strategy game gives you total control over the major battles of World War II. The full game will allow you to control over 100 vehicles as well as 50 different infantry units in Russian, German, and Allied campaigns.


Codename: Panzers

### Thief: Deadly Shadows

The game that invented the first-person-sneaker genre has returned! Take on the role of master thief Garrett as he sneaks about, whacking bad guys and making off with all kinds of treasure. This demo includes a tutorial as well as the first mission from the game. NOTE: You must have a Pixel Shader 1.1—compatible videocard to play this game, so check the readme file to see if your card will work.

### Scrapland

From the twisted mind of American McGee comes his all-new game, *Scrapland*. Play as the robot D-Tritus in this open-ended game that involves both combat and space racing. You can even take over the bodies of people you meet to use their particular skills and attributes to overcome the game's obstacles.

### Rome: Total War

The mother of all strategy games has arrived with *Rome: Total War*. This demo includes both a tutorial as well as the Battle of Trebia, and the full game puts you in the slippers of the mighty Hannibal as he races his army to the Roman capital to take on the almighty Caesar and the Roman army. Just be careful with those elephants!

## MOVIES

### Unreal Engine 3

Sit back and watch in awe as the technology for the upcoming Unreal 3 game is displayed in this breathtaking video. This technology is expected to surface in 2006, so it's definitely "next gen"!

### *Star Wars:* Battlefront

This is the trailer for the all-new *Star Wars: Battlefront* online multiplayer shooter. This all-new squad-based game lets you play in locales from all six movies as either the enemies or the good guys! It's the ultimate *Star Wars* game, available in September 2004!

Star Wars: Battlefront

### *Star Wars* Galaxies: Jump to Lightspeed

This is the trailer for the highly anticipated *Star Wars Galaxies* MMORPG expansion pack, *Jump to Lightspeed*! This killer add-on lets you acquire, build, and customize your own spaceship!

Noisemaker
Thief: Deadly Shadows

It requires Quicktime to play, so if you don't have a copy, grab it from the disc's Extras section.

## EXTRAS

### AquaMark

This 3D benchmark is dubbed "the reality benchmark," since it uses a 3D engine from an actual game on store shelves. It's primarily a DirectX 9 benchmark, so your performance in this benchmark can be used to gauge performance on the current crop of DX9 games. You can use before and after upgrading to measure your improvement!

Star Wars Galaxies: Jump to Lightspeed

### 3DMark 2003

Dubbed "the gamer's benchmark," 3D Mark makes heavy use of current generation pixel and vertex shaders as well as ragdoll physics. For comparison, our 2004 Dream Machine scored over 12,000 3D Marks, so run the utility on your rig and see how it compares!

### Nvidia Forceware 61.77

In order to get the best performance from your videocard, you need the latest drivers—so here they are! These are drivers for Windows 2000 and XP for nVidia GeForce videocards.

### ATI Catalyst 4.8

You should always run the latest version of your videocard manufacturer's drivers, so get to it! These are drivers for ATI Radeon graphics cards running on Windows XP.

### Fraps 2.2.5

This is the best screencap and video capture software on the Internet. Use it to take screenshots with any key you like, or to record in-game movies! This demo version puts a watermark in the video-capture screen and has a limit of 30 seconds.

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# Fall 3D Gaming Sneak Preview

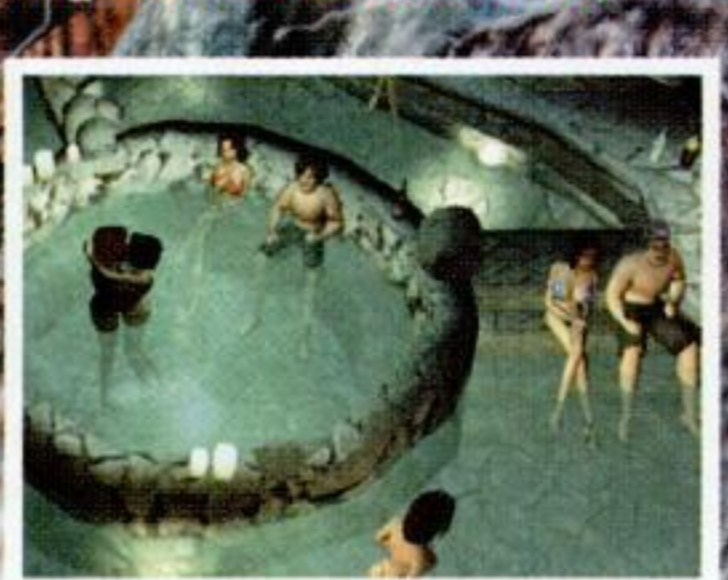
*Maximum PC sorts the wheat from the chaff to bring you the Top Ten must-have 3D games for this Holiday season*

**Star Wars: Republic Commando**

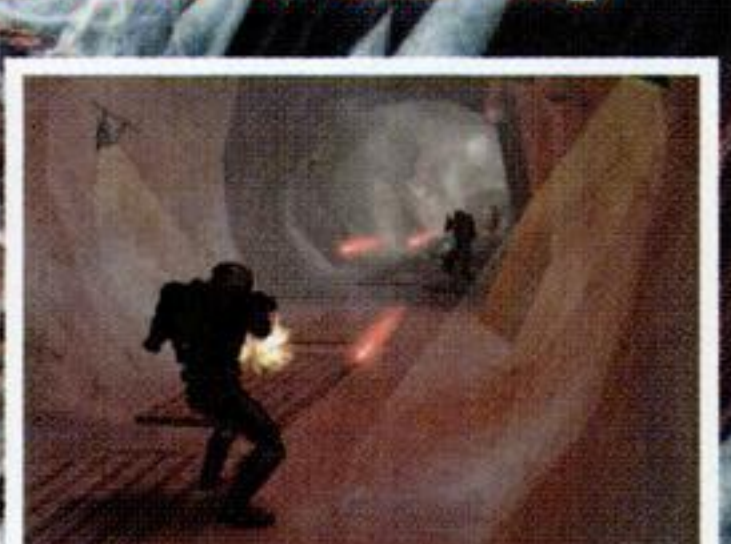
**S.T.A.L.K.E.R.: Shadow of Chernobyl**

**EverQuest 2**

**Half-Life 2**



**Playboy: The Mansion**



**Star Wars Battlefront**

**The Sims 2**

**Lord of the Rings: The Battle for Middle-Earth**

If you haven't upgraded, purchased, or built a new PC for a while—and Doom 3 hasn't provided the needed kick in the pants—this Holiday season's crop of cutting-edge, 3D titles may be the catalyst you've been waiting for. In addition to Id's latest opus, many other popular series are receiving long-awaited sequels, and some of the hottest franchises may finally be spawning some amazing games. Fan favorites like *Half-Life, EverQuest,* and *Black & White* are getting total makeovers with new engines, stories, and major gameplay enhancements. Also, the *Lord of the Rings, Star Wars,* and *Warhammer 40,000* universes may finally be producing games worthy of their high-profile licenses.

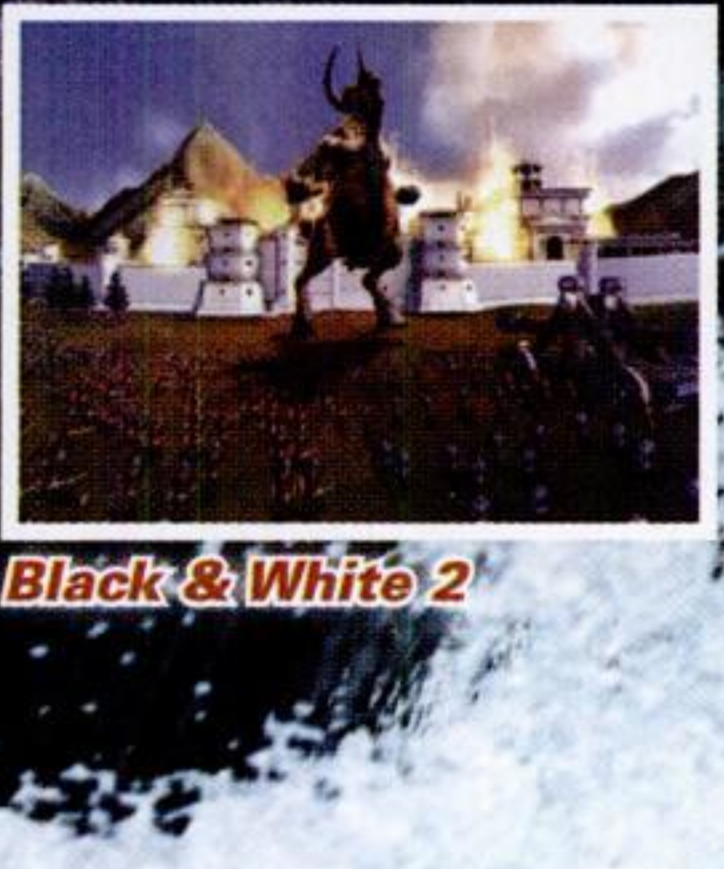
Naturally, the majority of these games will sport new, bleeding-edge 3D engines, capable of rendering monsters, vehicles, and environs consisting of millions of polygons, and they will likely gobble up every ounce of speed your PC can muster. Without at least an Nvidia 5900- or ATI 9800-class video card; 2+GHz CPU, 512MB RAM, and 7,200RPM drive, you'll likely be left out in the cold. Of course, an Nvidia 6800 or ATI X800's even better... as are a 3+GHz CPU, 1GB RAM, and a 10,000RPM SATA drive. But this is a *Maximum PC* publication and you, like us, don't mind keeping up with the technology race—in fact, that's half the fun, right?

What good is having the biggest, fastest PC on the planet without software that pushes its limits? If you bring the proper hardware to the table, it's a guarantee that you're going to be treated to the most realistic, fluid graphics and special effects the medium has ever seen. (If your PC is a bit "out of date," don't worry: The rest of this issue is jam-packed with all the latest hardware and tweaks you need to get "in the 3D game.")

With so much gaming potential on the horizon, the trouble may just be in deciding which games to buy. We're here to help: The following ten 3D games are those we've pegged as *the* ones to watch. No matter where your tastes may lie, something here should stoke your fire—and look positively resplendent on your screen. Time will tell whether the gameplay can live up to the technical packaging, but these 3D games hold the highest entertainment potential for your gaming dollar. (All are slated to ship by year's end, but you can expect at least one or two to slip to early 2005—it's the nature of the beast.) In addition, we've included bite-sized looks at a bevy of other promising 3D titles earmarked for store shelves by the end of 2005.

So turn the page and start drooling over the possibilities—it may be time to warn that special someone in your life that they won't be seeing you for awhile....

**Medal of Honor: Pacific Assault**

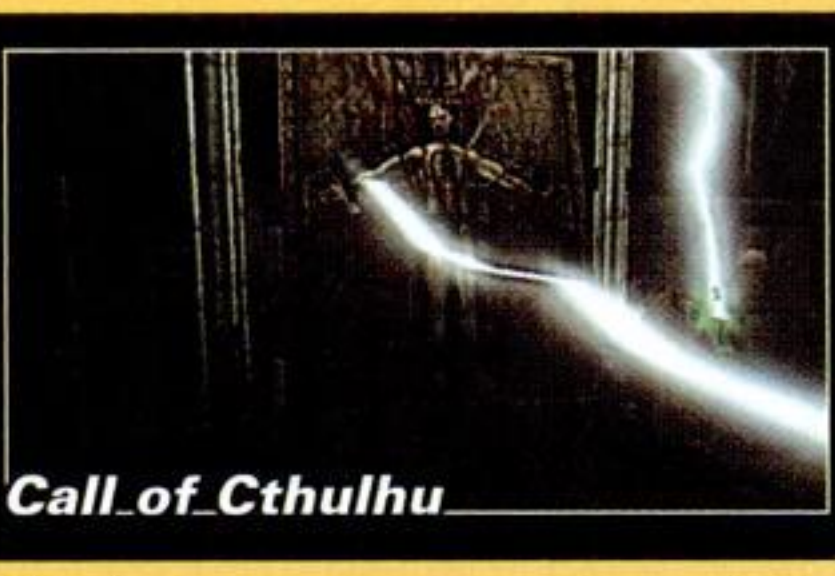


**Black & White 2**

**Evil Genius**

*Dungeon Keeper* meets James Bond in this "supervillain" simulation. You'll get to run your own evil lair and put your plans for world domination in motion, controlling henchmen, security systems, and doomsday weapons. Naturally, you must also preventing dashing secret agent "do-gooders" from thwarting your evil schemes.

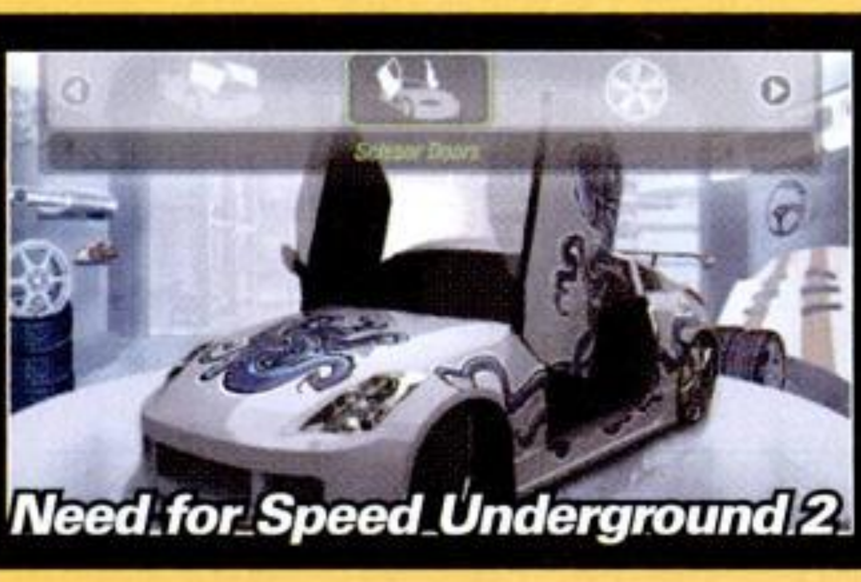
Developer: **Elixer Studios**
Publisher: **VU Games**
Web site: **www.vugames.com**
ETA: **Fall 2004**



**Call of Cthulhu**

This first-person screamer puts you in the shoes of Jack Walters, a derelict private detective who must uncover the horrifying secrets a certain 1920s New England town is hiding. The story, based on H.P. Lovecraft's terrifying works, may ensure that you'll never look at Rhode Island the same way again.

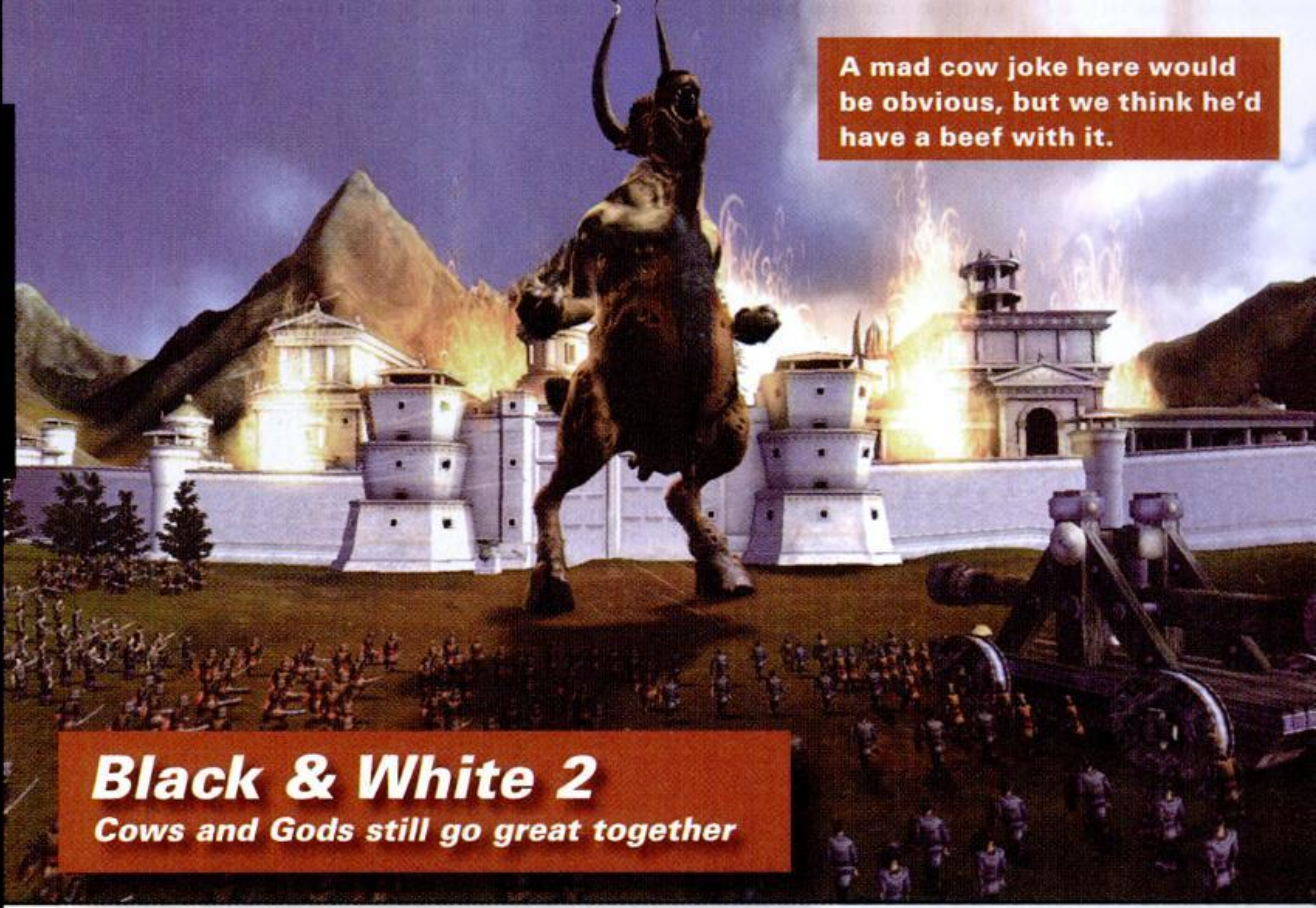
Developer: **Headfirst Productions**
Publisher: **Bethesda Softworks**
Web site: **www.bethsoft.com/games/games_callofcthulhu.html**
ETA: **September 2004**



**Need for Speed Underground 2**

*Need for Speed Underground 2* follows in its predecessor's footsteps with more street-racing, car-customizing, law-breaking action. Rather than the linear race progression of the first Underground, this game will let players explore a sprawling city, looking for races and upgrades.

Developer: **EA Canada**
Publisher: **EA Games**
Web site: **www.eagames.com/official/nfs/underground2/us/home.jsp**
ETA: **November 2004**



A mad cow joke here would be obvious, but we think he'd have a beef with it.

# Black & White 2

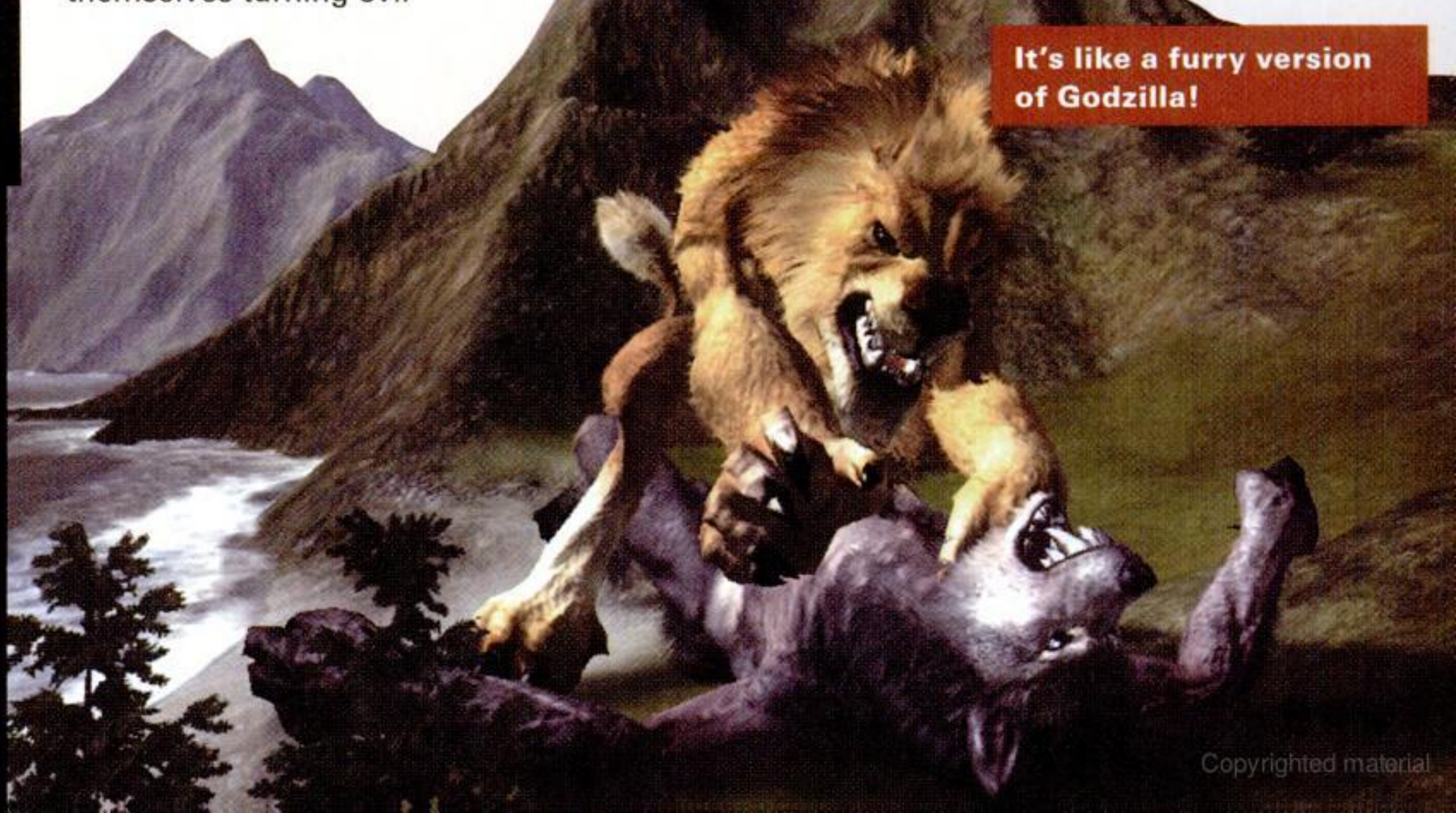
## Cows and Gods still go great together

Though its critical reception may have been mixed, the first *Black & White* was a sales success and achieved "cult hit" status with a core group of hardcore, loyal fans. If nothing else, it was extremely innovative and unique: Where else could you play the hand of God and make your giant pet cow eat innocent villagers? The sequel serves up even more luscious visuals, along with a subtler moral system in which choices aren't always black and white—a player's aggression can influence his moral standing just as much as how he treats his followers. Once again the player is thrust into the role of "playing god," raising and controlling worshippers with the aid of a giant pet creature, like a cow, a wolf or a lion. Villagers will build temples, armies will oppress villagers, and huge animals will eat armies, all in the name of you.

Much like the previous game, *Black & White 2* will incorporate a moral system in which players and their creatures will turn good or evil depending on their actions. These choices won't be clear-cut, however; crusading champions of justice will find themselves turning evil despite their intentions, while xenophobic despots will be considered good if they keep their people happy and their cities strong. Players can decide their morality by how they lead—aggressive gods will be seen as "evil," while peaceful gods will be seen as "good."

The engine is being completely rebuilt from the ground up, with improved graphics and detail—such as an all new weather system that impacts gameplay. Your pet creature will better than ever, and can be customized to your tastes, with a variety of color, style, and shape choices. It'll also be affected by its environment. For instance, the Lion's detailed fur will become matted with rain and blood, or singed by fire, resulting in an appropriate behavioral response.

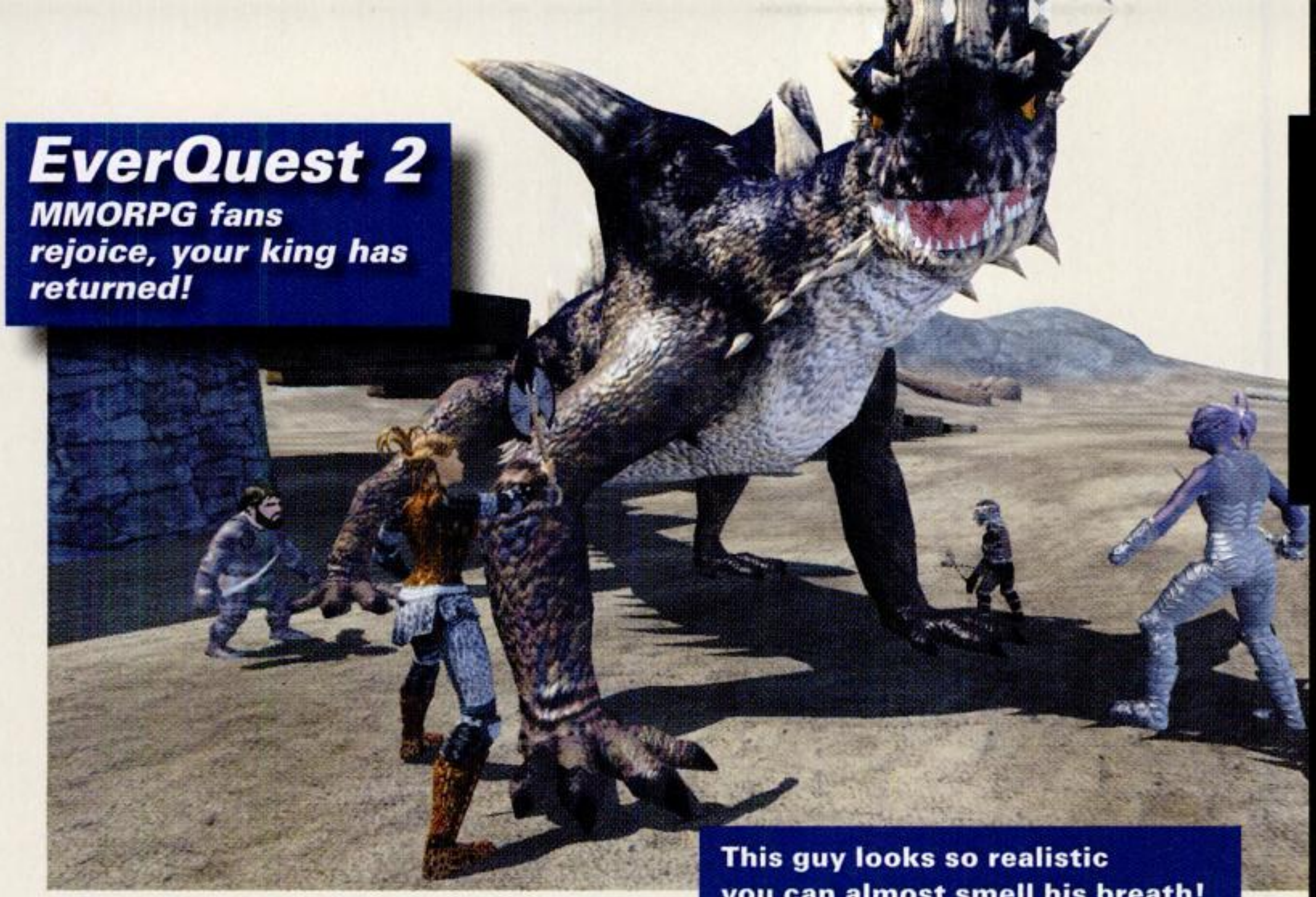
Developer: **Lionhead Studios**
Publisher: **EA Games**
Web site: **www.lionsource.com**



It's like a furry version of Godzilla!

# EverQuest 2

**MMORPG fans rejoice, your king has returned!**



This guy looks so realistic you can almost smell his breath!

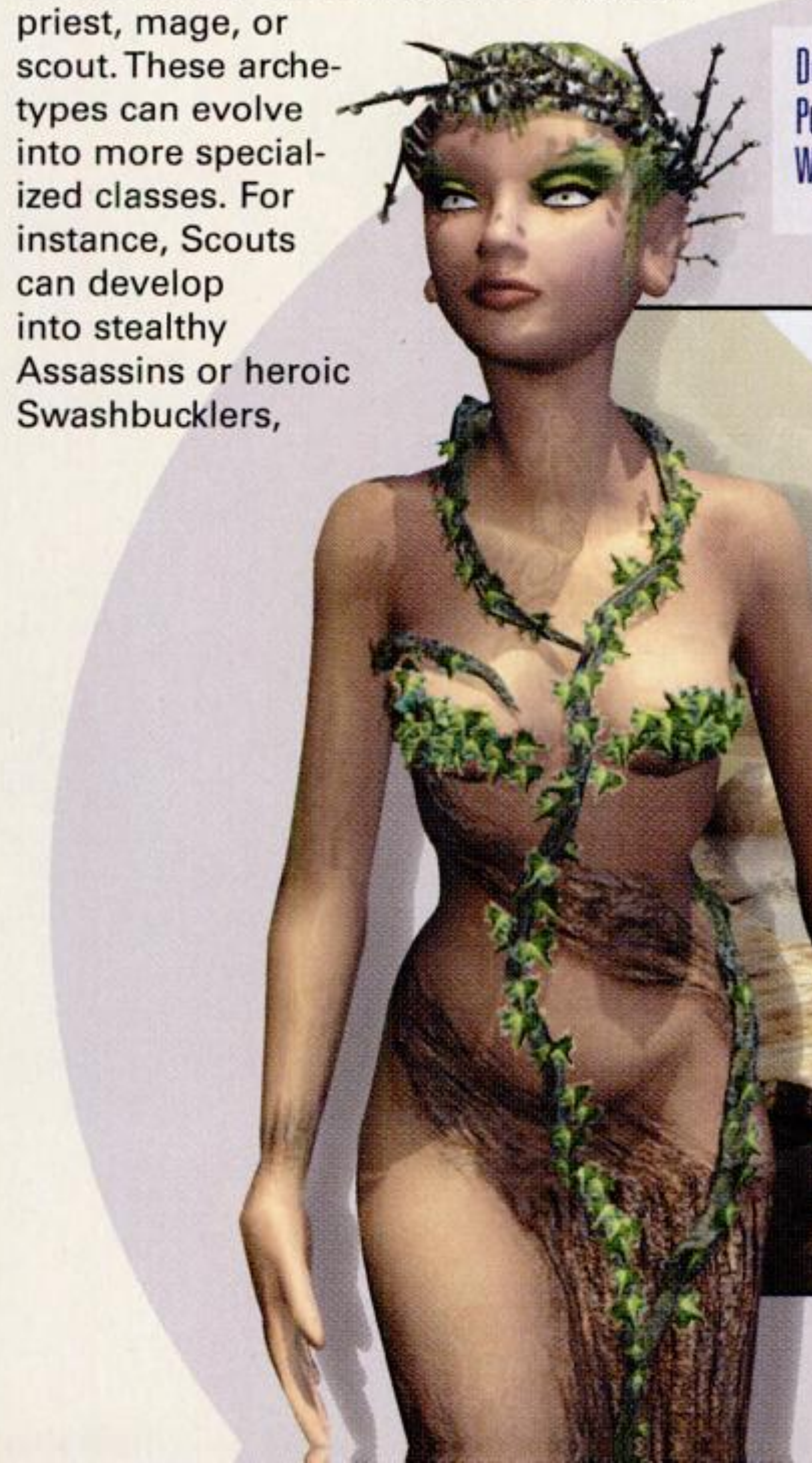
After eight expansions released and countless gamers' lives swallowed, *EverQuest* is finally getting its first true sequel. *EverQuest 2* depicts a Norrath scarred by disaster, 500 years after the original *EverQuest* takes place.

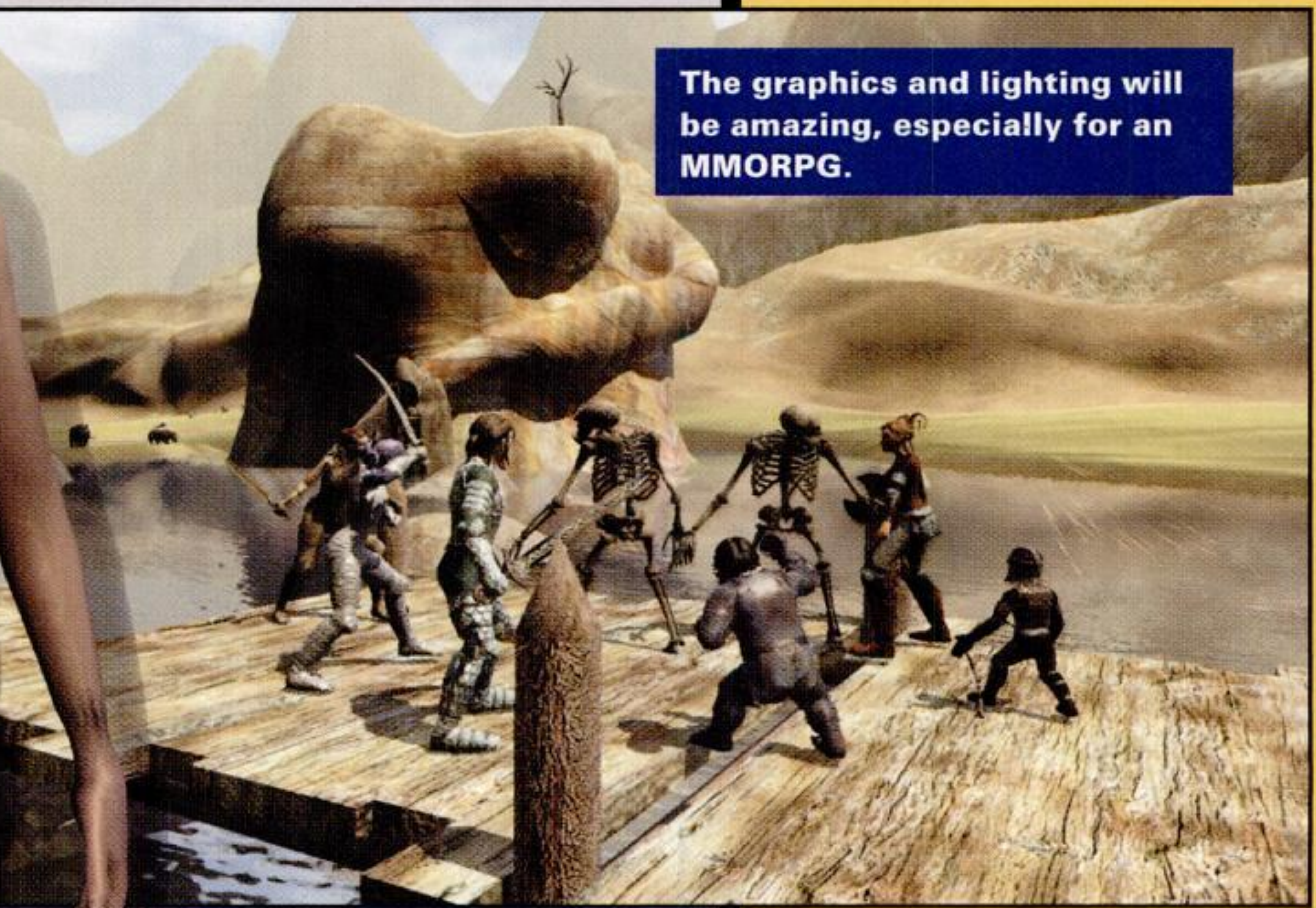
There, you'll become embroiled in the tense relationship of Qeynos and Freeport, the great "good" and "evil" cities that rose after the Age of Cataclysms. Qeynos built itself into a prosperous, peaceful metropolis after the cataclysms, while Freeport became a murky slum ruled by an evil tyrant.

Characters will develop through a system of branching class paths. After a short tutorial quest, you will commit to one of four class archetypes: fighter, priest, mage, or scout. These archetypes can evolve into more specialized classes. For instance, Scouts can develop into stealthy Assassins or heroic Swashbucklers, while Mages can develop into evil Necromancers or benign Illusionists. These specializations will let players carefully shape how their characters grow and change, and make the game feel more diverse in the process.

Contrary to *EverQuest*, artisan skills will be available from the get-go, allowing even "newbies" to learn to craft their own weapons and potions. This, combined with personalized homes in the city of their choice, gives players a great deal of options with which to "personalize" their character. Also, NPCs will now use voice-overs to relay quests and back-story elements, which means much less reading is required this go-around (which we couldn't be happier about).

Developer: **Sony Online Entertainment**
Publisher: **Sony Online Entertainment**
Web site: **www.EverQuest2.station.sony.com**





The graphics and lighting will be amazing, especially for an MMORPG.

**Call of Duty: United Offensive**

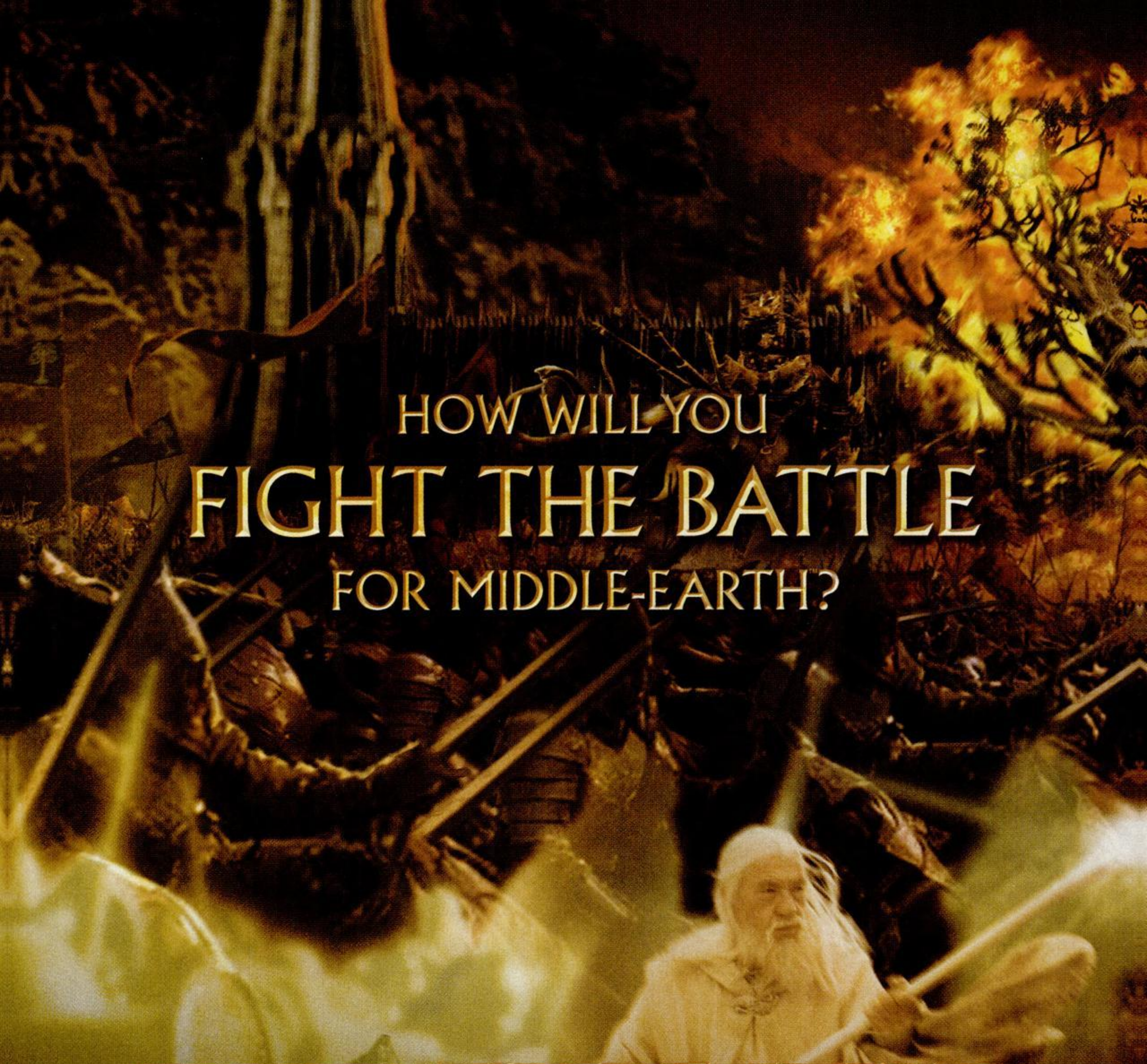
*Call of Duty* gets its first expansion with *United Offensive.* Players will fight in the Battle of the Bulge, the invasion of Sicily, and other landmark battles in WWII's European Theater. The expansion will introduce new multiplayer modes as well, including online tank combat.

Developer: **Activision**
Publisher: **Grey Matter**
Web site: **www.callofduty.com**
ETA: **October 2004**

**Superpower 2**

*Superpower 2* could make *Civilization* look downright shallow. Based on real-world census and political data, this macro-strategy game will let players run any country on Earth, from the smallest third-world nation to the United States superpower itself. Yes, there will be a nuclear war option. Would you like to play a game?

Developer: **GolemLabs**
Publisher: **DreamCatcher Interactive**
Web site: **www.dreamcatchergames.com/dci/superpower2**
ETA: **October 2004**



Command any of four different armies, each with their own unique playing styles, resource management and base-building techniques.

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## Cold War

Set in the 1980s, *Cold War* will put you in the shoes of a journalist who travels to Moscow only to get shanghaied. Stealth will be key as you use makeshift weapons and gadgets to find out what's rotten in the state of Russia. Expect a tense, politically charged plot full of intrigue and mystery—with a healthy dose of action.

**Developer:** Bohemia Interactive
**Publisher:** Codemasters
**Web site:** www.dreamcatchergames.com/dci/cold_war
**ETA:** December 2004

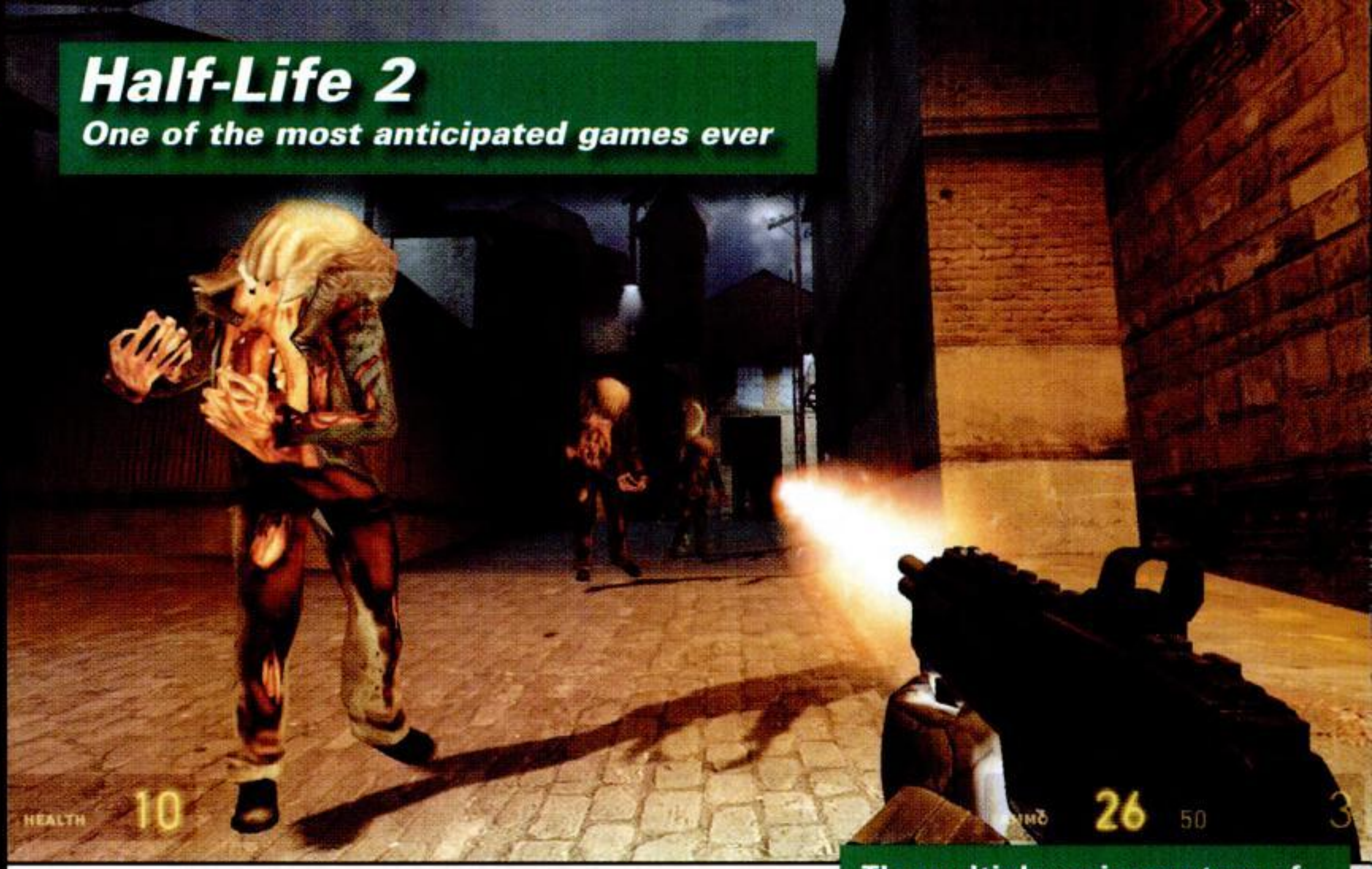
## Star Wars Galaxies: Jump to Lightspeed

Star Wars fans rejoice, and dust off those joysticks: The online moment you've been waiting for will soon be reality. This add-on for the MMORPG *Galaxies* (the full version of which is on our DVD!) will finally let you jump into the cockpits of X-Wings, TIE Fighters, and even the Millenium Falcon (which you can pilot with other players onboard). How fast can your ship make the Kessel Run?

**Developer:** Sony Online Entertainment
**Publisher:** LucasArts
**Web site:** www.lucasarts.com/games/swgalaxies_lightspeed/

## Half-Life 2

### One of the most anticipated games ever



From the moment Gordon Freeman stepped off of the tram and into the Black Mesa Research Facility, gamers were enraptured with *Half-life.* The incredible storytelling, tense atmosphere, and cleverly scripted events really put you in the shoes of this unassuming scientist, facing the consequences of an experiment gone horribly wrong.

*Half-Life 2,* which may be out by the time you read this (fingers crossed), takes place after the events of *Half-Life.* The alien Xen and a group called the Combine have taken over Earth, and Gordon finds himself in occupied "City 17," working for the mysterious "G-Man" from the first game.

Created with Valve's new Source engine (see page 49 for more details) *Half-Life 2* will feature incredibly detailed graphics and realistic physics—objects will be controlled by their virtual mass, and will wobble, fall, and crush characters according to the laws of gravity and motion. Characters will seem much more real, too, thanks to the addition of 40 "facial muscles," resulting in more lifelike expressions.

**The multiplayer is courtesy of updated *Counter-Strike* code.**

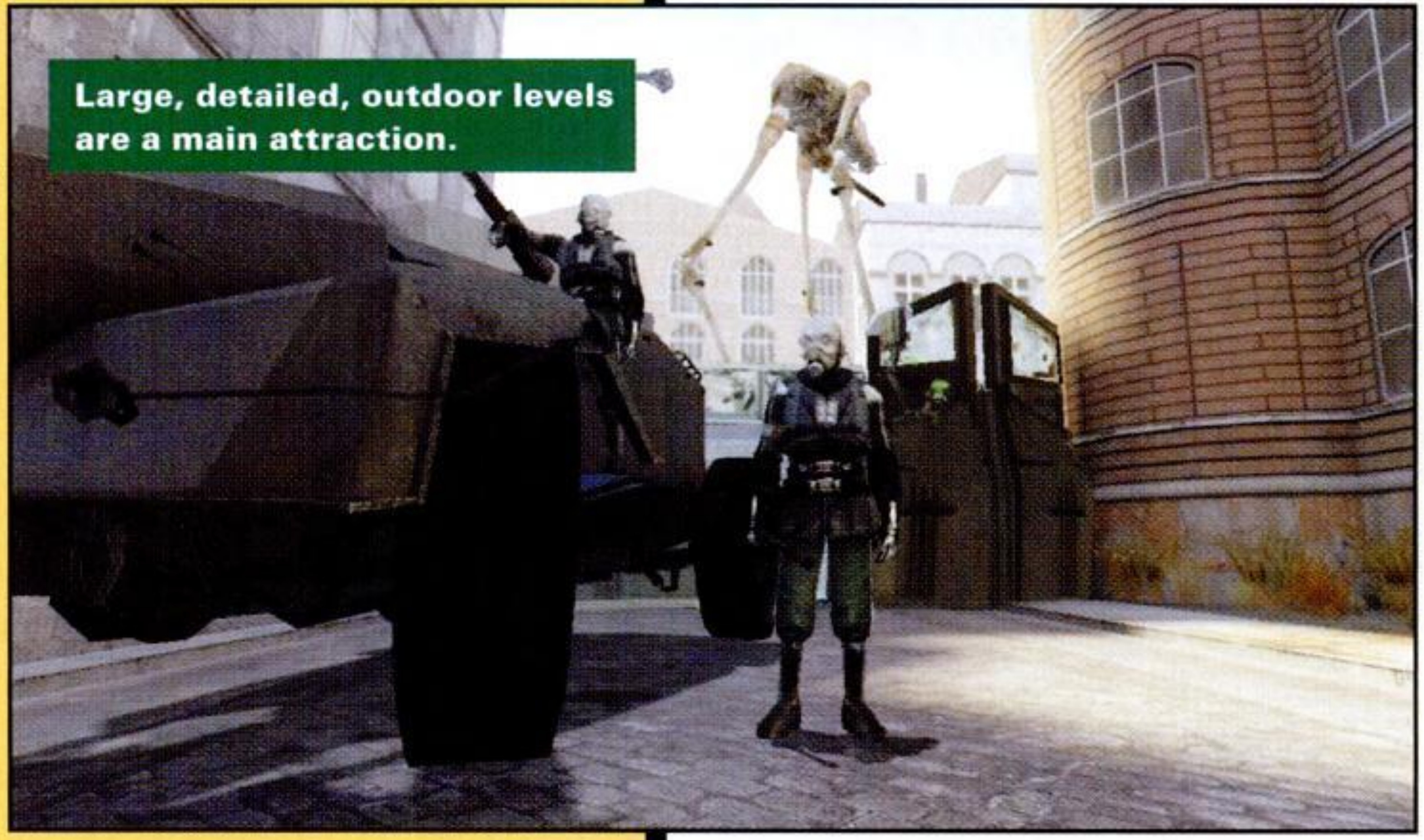
The head-crabs, zombies, and bullsquids from the original game will be back, and Gordon will fight new enemies as well, such as Combine soldiers, new Xen aliens, and a giant "War of the Worlds"-style enemy called the "Strider."

Gordon won't be alone in his battle against the aliens, nor will he be unarmed. The creepy G-Man will be back, as will the beloved faceless scientists of Black Mesa. Even Barney Calhoun, the security guard from *Half-Life: Blue Shift,* will appear in the game. *Half-Life 2* will also introduce former Black Mesa scientist Eli Vance and his daughter Alyx. Alyx will serve as Gordon's erstwhile sidekick for part of the game.

*Half-Life 2* will be released with a ton of extras that will make gamers very, very happy. The standard version will come with a Source engine-based port of the classic multiplayer game *Counter-Strike.* As if that wasn't enough, the collector's edition of *Half-Life 2* will even include the full version of the original *Half-Life,* adapted to the Source engine! So not only will you get a brand-new game with brand-new graphics, but some of your favorite old games with the same new graphics technology as well.

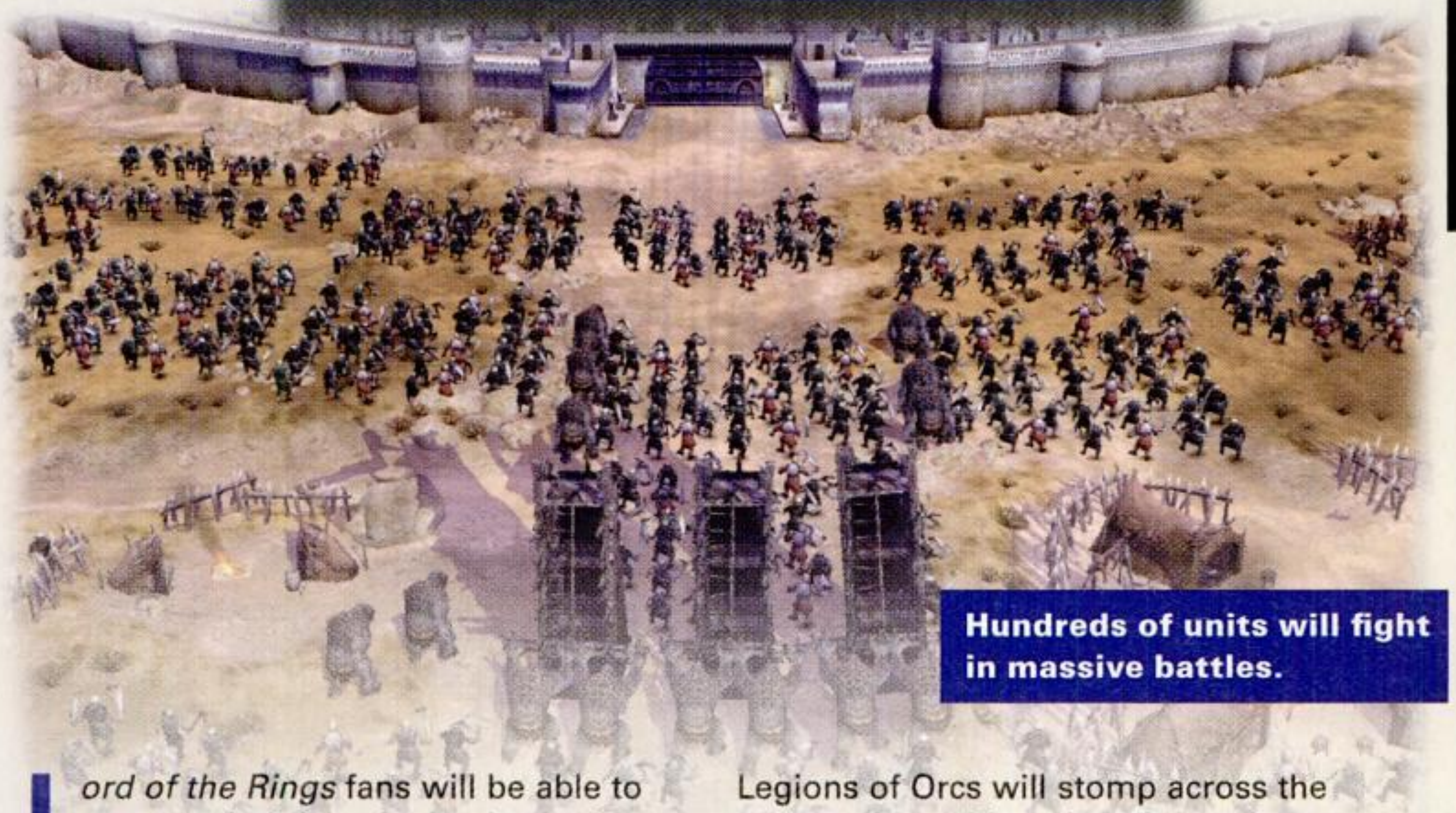
**Developer:** Valve Software
**Publisher:** VU Games
**Web site:** www.half-life2.com

**Large, detailed, outdoor levels are a main attraction.**



# *Lord of the Rings, The Battle for Middle-Earth*

***One RTS to rule them all***



**Hundreds of units will fight in massive battles.**

*Lord of the Rings* fans will be able to re-enact their favorite battles in this upcoming strategy game from EA Games. Tolkien's classic armies will face-off in epic clashes, with hundreds of detailed units on each side, in what could be the best *Lord of the Rings* game yet.

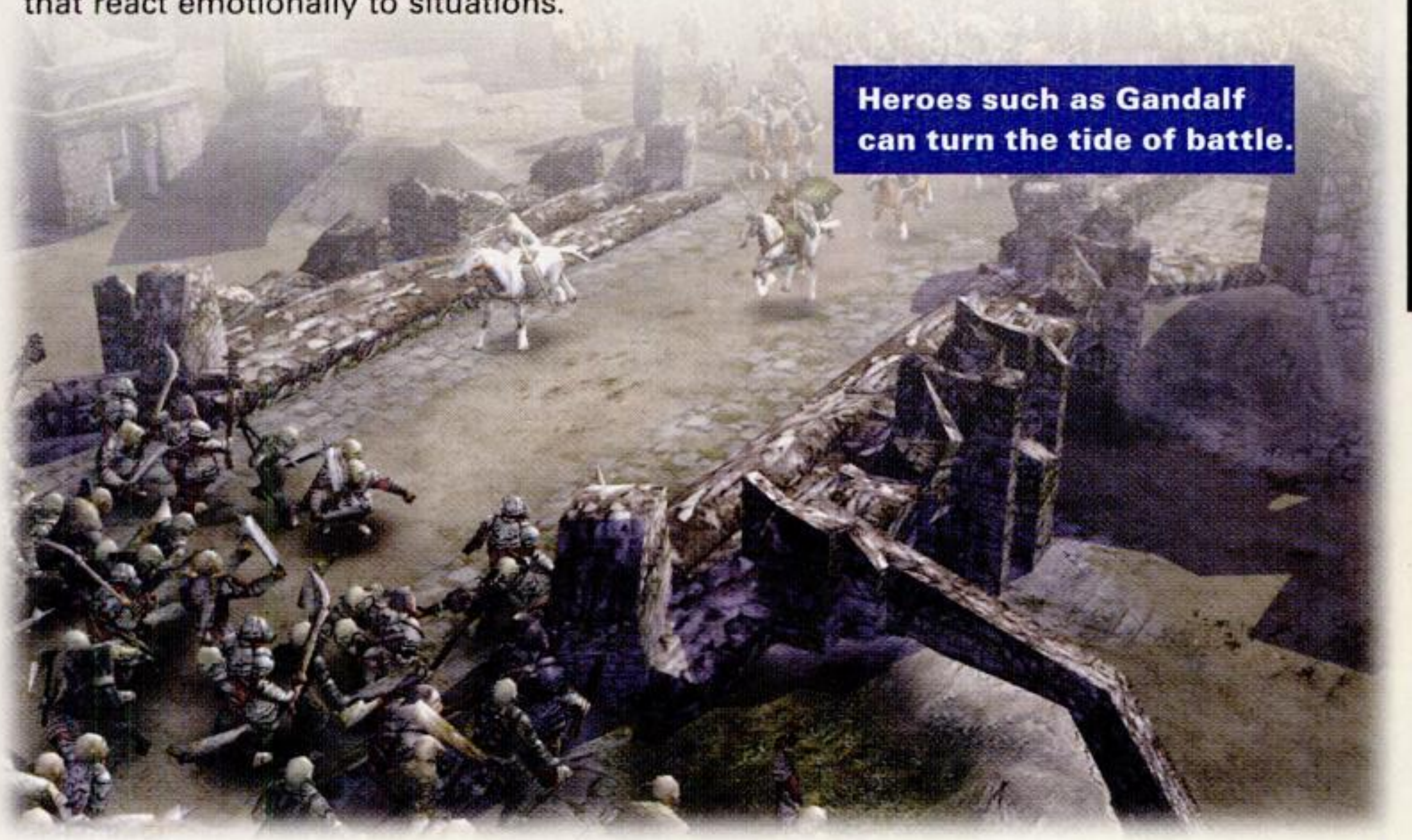
*The Battle for Middle-Earth* will have 25 missions depicting famous conflicts in the trilogy, like the Battle of Isengard and the Battle of Helm's Deep. You'll also be able to march your persistent army (units carry over from one mission to the next) across Middle-earth and conquer the world itself. The game's grand scope promises to satisfy any fantasy fan who ever read about the battle of Helm's Deep and thought, "I could have done better!"

You can choose to take control of the Riders of Rohan, the army of Gondor, the hordes of Mordor, or the forces of Isengard. Each faction will have widely different units and strategies, forcing players to adapt their tactics to be successful on the field of battle.

The game will be extremely detailed, with destructible battlefields and units that react emotionally to situations. Legions of Orcs will stomp across the countryside, with a giant Balrog in tow knocking trees over and causing opposing enemies to flee in terror at the sight. If a hero is present to rally the scared troops, they'll regain their confidence and cheer as they bravely rush the enemy. All units will ultimately respond to commands, but these initial emotional reactions will give the game's grand scope a sense of depth and humanity. Hero characters like Gandalf and Aragorn will lead the forces into battle, commanding armies and growing in skill and power as they advance through the game.

Like any good RTS, *The Battle for Middle-Earth* will support a multiplayer mode as well, letting Tolkien fans put the Riders of Rohan and Orcs to the ultimate test online.

Developer: **EA LA**
Publisher: **EA Games**
Web site: **www.eagames.com/official/lordoftherings/thebattleformiddleearth/us/**



**Heroes such as Gandalf can turn the tide of battle.**

***Tribes: Vengeance***

The futuristic online shooter series finally gets a single-player treatment in *Tribes: Vengeance*. You'll have access to classic and new weapons, vehicles, and armor suits as you play your part in a massive war between the Tribes and the Empire. Beside the single-player campaign, up to 32 players can defend the honor of their Tribe online.

Developer: **Irrational Games**
Publisher: **VU Games**
Web site: **www.vugames.com**
ETA: **Fall 2004**

***Brothers in Arms***

This World War II shooter endeavors to realistically re-create a week in the life of an Allied regiment during the pivotal Normandy campaign in Europe. The developers hired retired Army colonel John Antai as an advisor to help ensure that the World War II experience in *Brothers in Arms* will be as true-to-life as possible.

Developer: **Gearbox Software**
Publisher: **Ubisoft**
Web site: **www.brothersinarmsgame.com**
ETA: **October 2004**

***Rollercoaster Tycoon 3***

The popular theme park-management simulation finally makes the switch to total 3D, and it looks fantastic. With more attractions, improved interaction, and a day-night cycle that will let you turn your "kiddie park" into a hip adult hangout, this should be one addictive ride.

Developer: **Frontier Developments**
Publisher: **Atari**
Web site: **www.rollercoastertycoon.com**
ETA: **November 2004**

**Empire Earth 2**

Vivendi's age-spanning real-time strategy behemoth returns, with improved graphics and four distinct civilization groups. Players will shape different civilizations from the West, the East, the Middle East, and South America. They will be charged with building an empire from a tribe of mere cavemen, which you will mold and grow into a futuristic nation armed with giant robots.

**Developer:** Mad Doc Software
**Publisher:** VU Games
**Web site:** www.vugames.com
**ETA:** Q1 2005

**World of Warcraft**

The long-awaited *Warcraft* MMORPG will be set four years after the end of *Warcraft III: Reign of Chaos*, and will let players serve the Alliance or the Horde as humans, dark elves, zombies, and orcs. Azeroth's fate hangs in the balance, and players can decide to save it or destroy it. Zug zug!

**Developer:** Blizzard Entertainment
**Publisher:** Blizzard Entertainment
**Web site:** www.blizzard.com/wow
**ETA:** Fall 2004

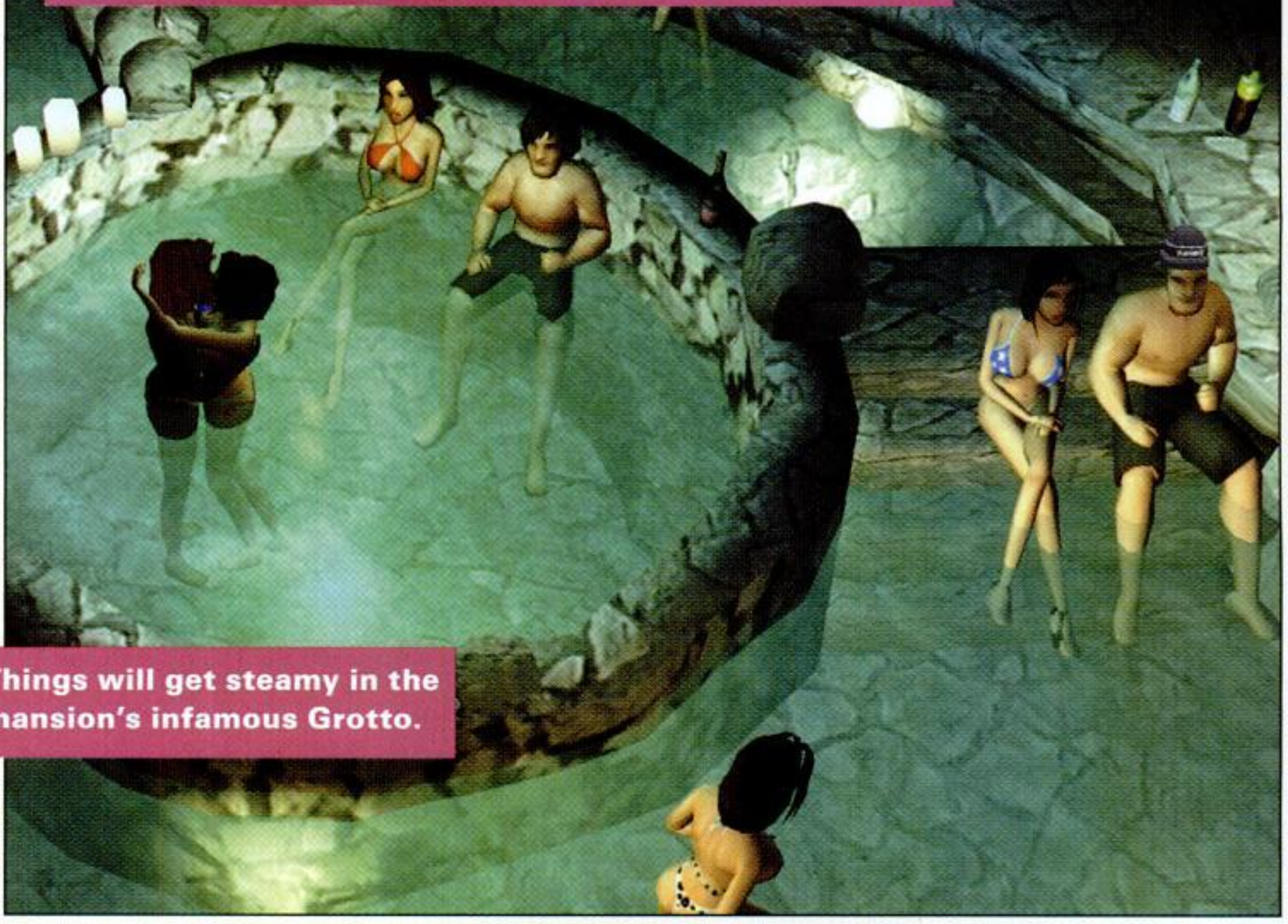
**Wish**

Billed as the first "Ultra Massively Multiplayer Role Playing Game," *Wish* will let more than 10,000 players explore the massive, seamless world of Ganedan. Unlike other MMORPGs, *Wish* won't be defined by discrete zones or areas, but will instead be a single, consistent landscape.

**Developer:** Mutable Realms
**Publisher:** Mutable Realms
**Web site:** www.mutablerealms.com
**ETA:** Winter 2004

# Playboy: The Mansion

## See Hef. See Hef Run. See Hef Run Playboy.



Things will get steamy in the mansion's infamous Grotto.

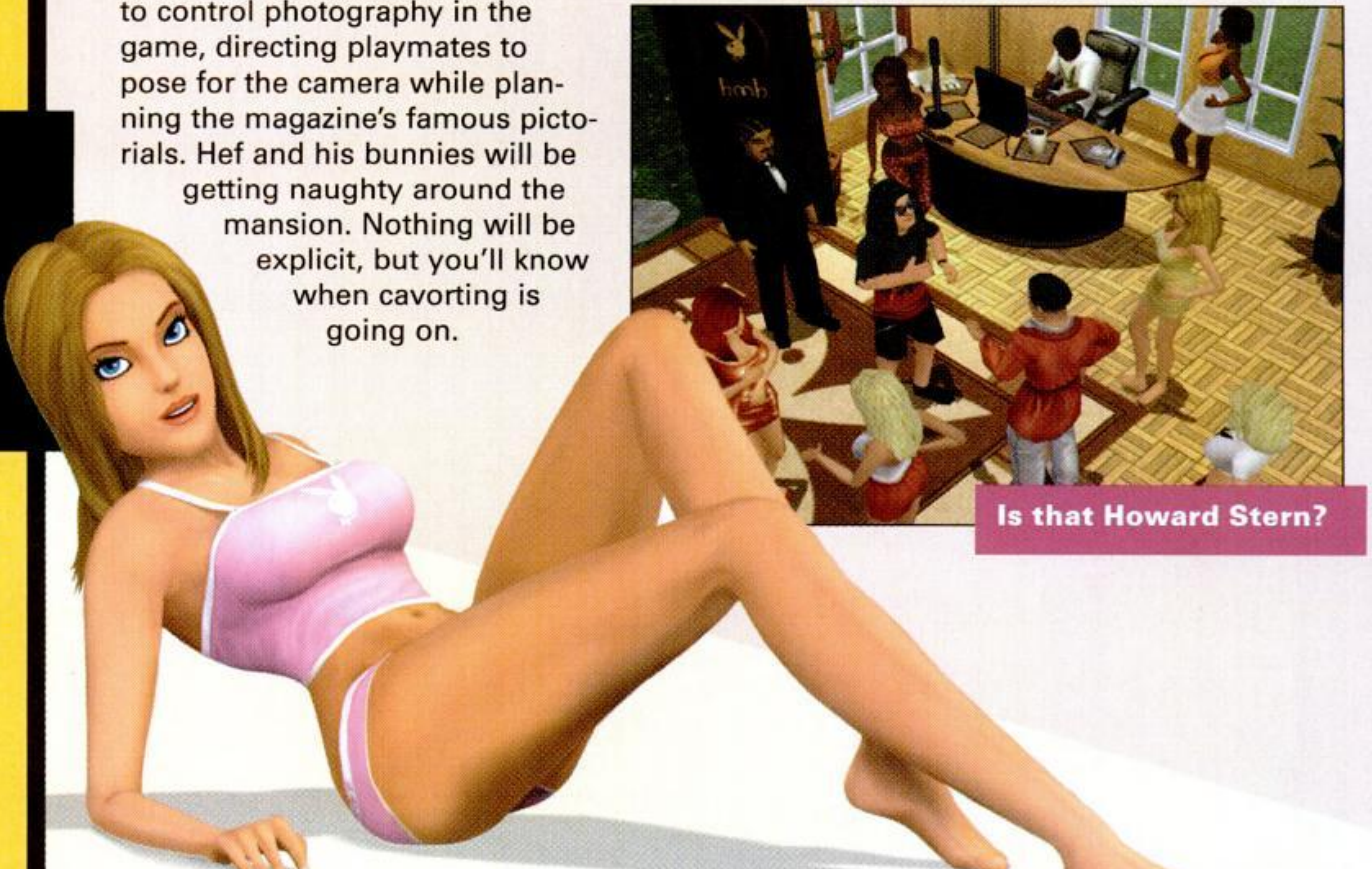
The man most famous for wearing a bathrobe is finally getting his own computer game. In *Playboy: The Mansion*, players will get to fill Hef's slippers, building up their own magazine empire from the comfort of the famous Playboy Mansion. Clearly, the game's M rating will be completely justified.

Though it might look like *The Sims* at first, *Playboy: The Mansion* will play more like an empire builder. You'll be able to develop the infamous mansion any way you see fit, all while holding the reins of *Playboy* itself, trying to build up its circulation and popularity--in between the celebrity-filled parties, naturally.

As you might expect, sex will be a major part of the game. You will be able to control photography in the game, directing playmates to pose for the camera while planning the magazine's famous pictorials. Hef and his bunnies will be getting naughty around the mansion. Nothing will be explicit, but you'll know when cavorting is going on.

The game's campaign will consist of a dozen missions, chronicling Hef's development of the revolutionary publication. Players will see what it's like to be Hef as he turns *Playboy* from a new magazine into a great, best-selling juggernaut. A simplified, "sandbox-like" empire-building mode will also be available, for those that just want to play with the game's... eye candy.

**Developer:** Cyberlore Studios
**Publisher:** Arush Entertainment
**Web site:** www.arushentertainment.com/games/playboy/



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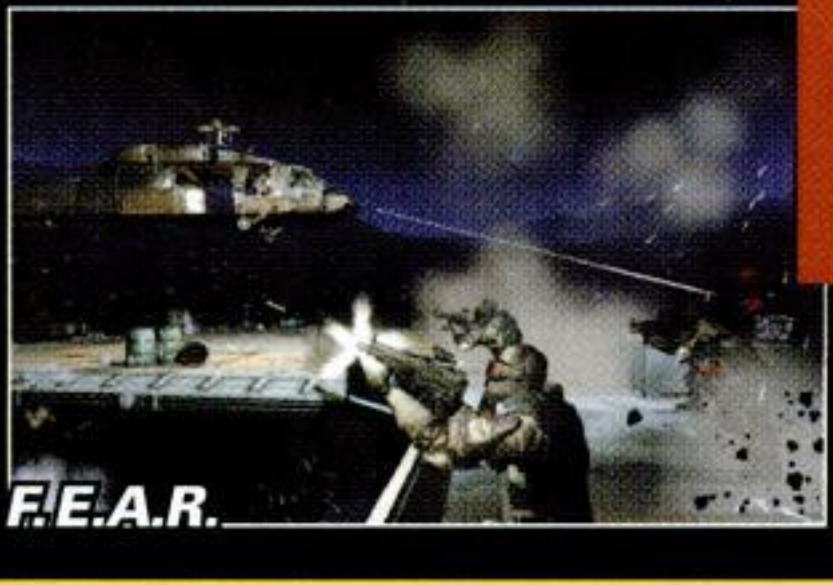


**F.E.A.R.**

This atmospheric squad-based shooter will put you in control of a band of psychic-powered government agents attempting to infiltrate an aerospace installation taken over by terrorists. Oh yeah, your task is to find out why the Special Ops team that went before you was slaughtered–without a shot fired.

**Developer: Monolith Productions**
**Publisher: VU Games**
**Web site: www.vugames.com**
**ETA: 2005**

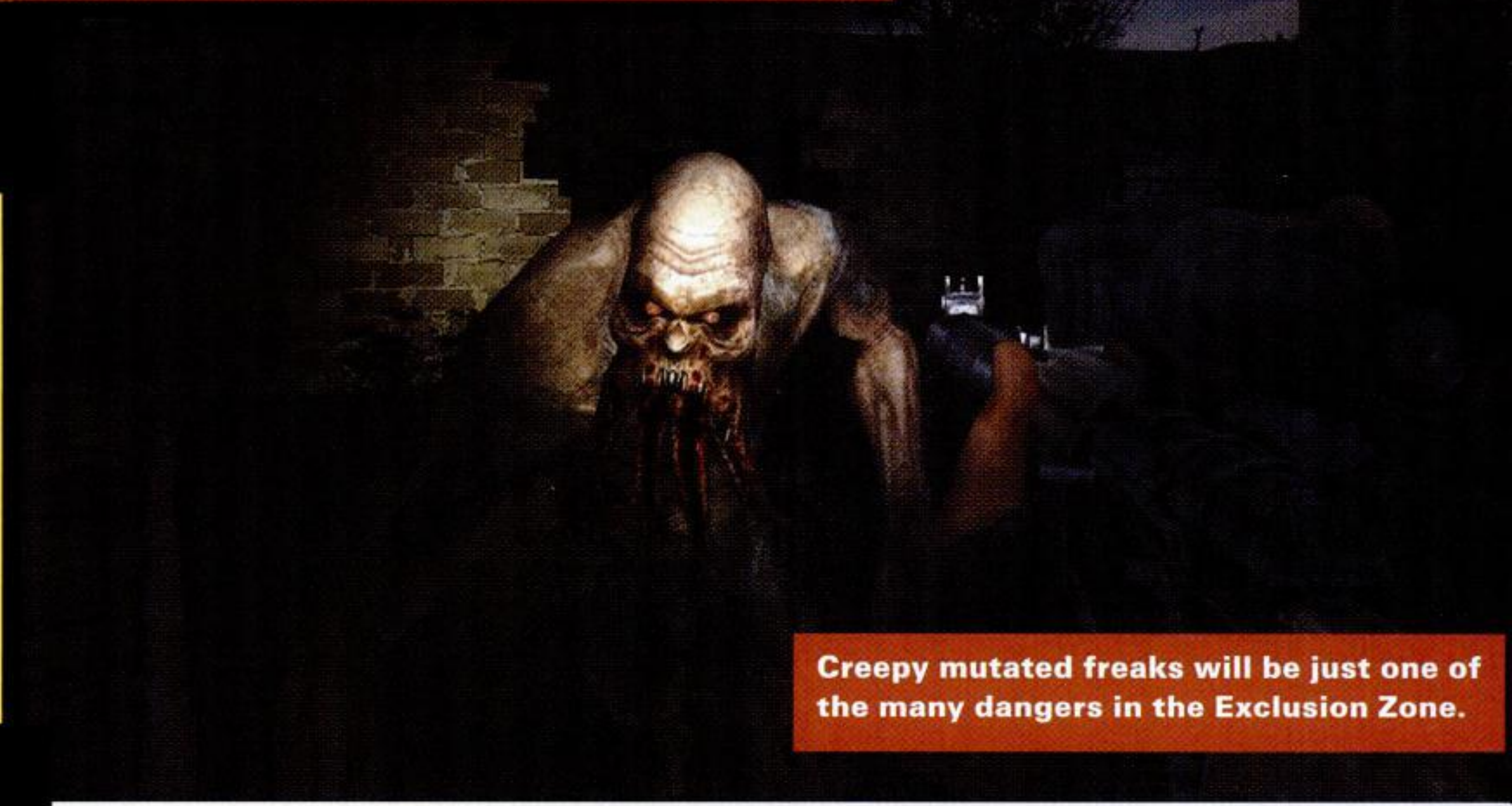
**Splinter Cell 3**

Sam Fisher returns once again in the third iteration of the popular stealth action series. This time the game promises to be darker and grittier, with Fisher getting much more freedom to kill. A cooperative multiplayer mode will let multiple spies infiltrate and assassinate online.

**Developer: Ubisoft**
**Publisher: Ubisoft**
**Web site: www.splintercell3.com**
**ETA: Winter 2004**

# *S.T.A.L.K.E.R.: Shadow of Chernobyl*

***Freely explore a living, breathing, irradiated disaster site***



Creepy mutated freaks will be just one of the many dangers in the Exclusion Zone.

Programmers trekked to the site of the world's worst nuclear disaster just to plan the setting for *S.T.A.L.K.E.R.: Shadow of Chernobyl.*

Set in the near future, *S.T.A.L.K.E.R.* takes place in the Chernobyl area, a few years after a mysterious explosion rocked the disaster site once again. You play as a Stalker, a mercenary explorer who goes into Chernobyl's Exclusion Zone to find your fortune. The developers painstakingly re-created 30 square kilometers of Chernobyl's urban wasteland for the game.

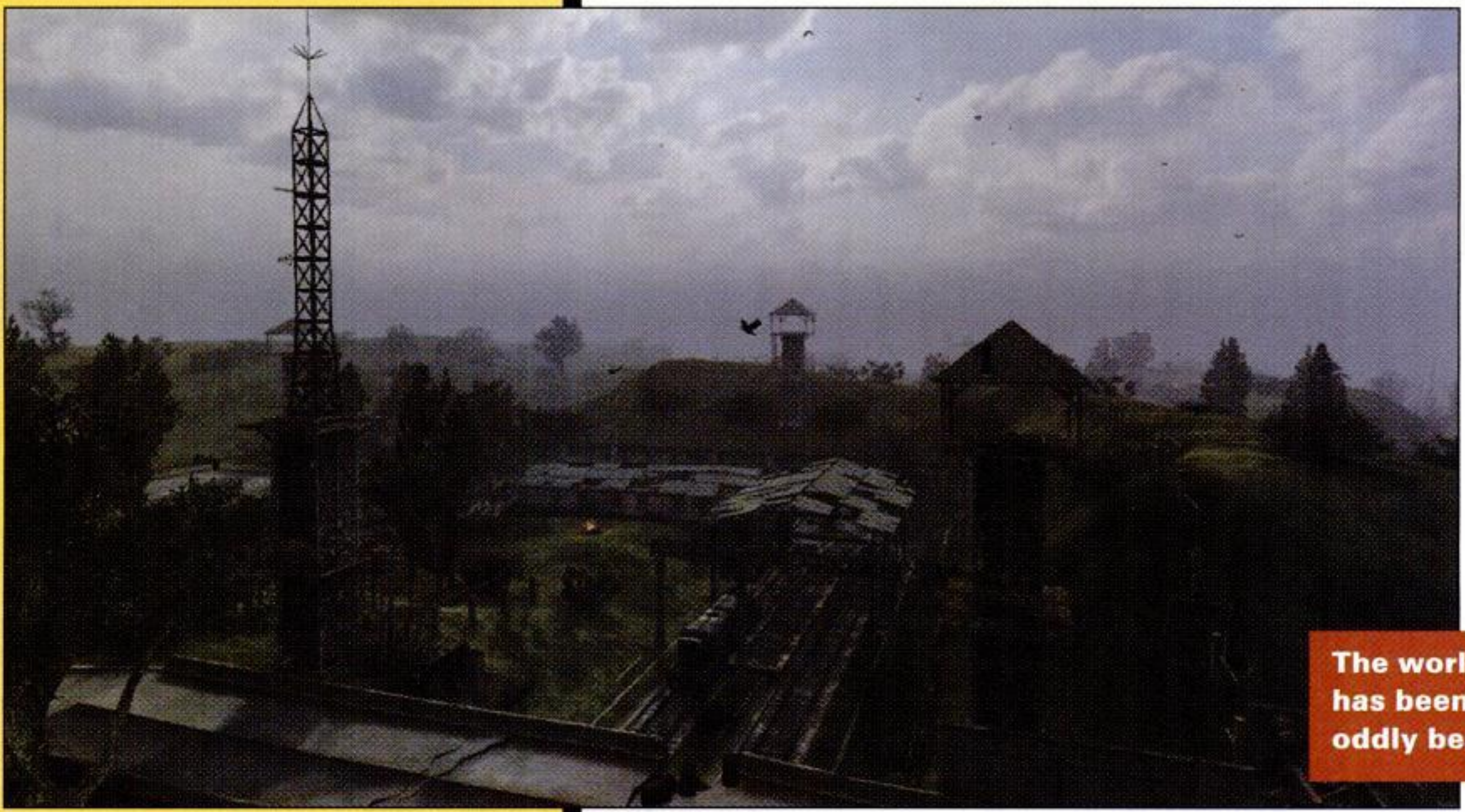
*S.T.A.L.K.E.R.* will be completely open-ended, letting players freely explore the disaster site. The developers have said that their greatest influences for the game are the milestone games *Elite*, *Daggerfall*, and *Fallout*. While it looks like an FPS, *S.T.A.L.K.E.R.* will let players explore even the gameworld and trade with other Stalkers. *S.T.A.L.K.E.R.* will have a storyline players can follow, but the game's emphasis will remain on total freedom of gameplay—similar to the hallmark games noted above.

The Exclusion Zone will be a living, breathing world in which characters and creatures freely interact. Fellow Stalkers will explore the Zone and compete against each other—and Chernobyl's denizens—for resources and riches. And creatures will hunt in packs, turning on each other, or you, when they run out of food.

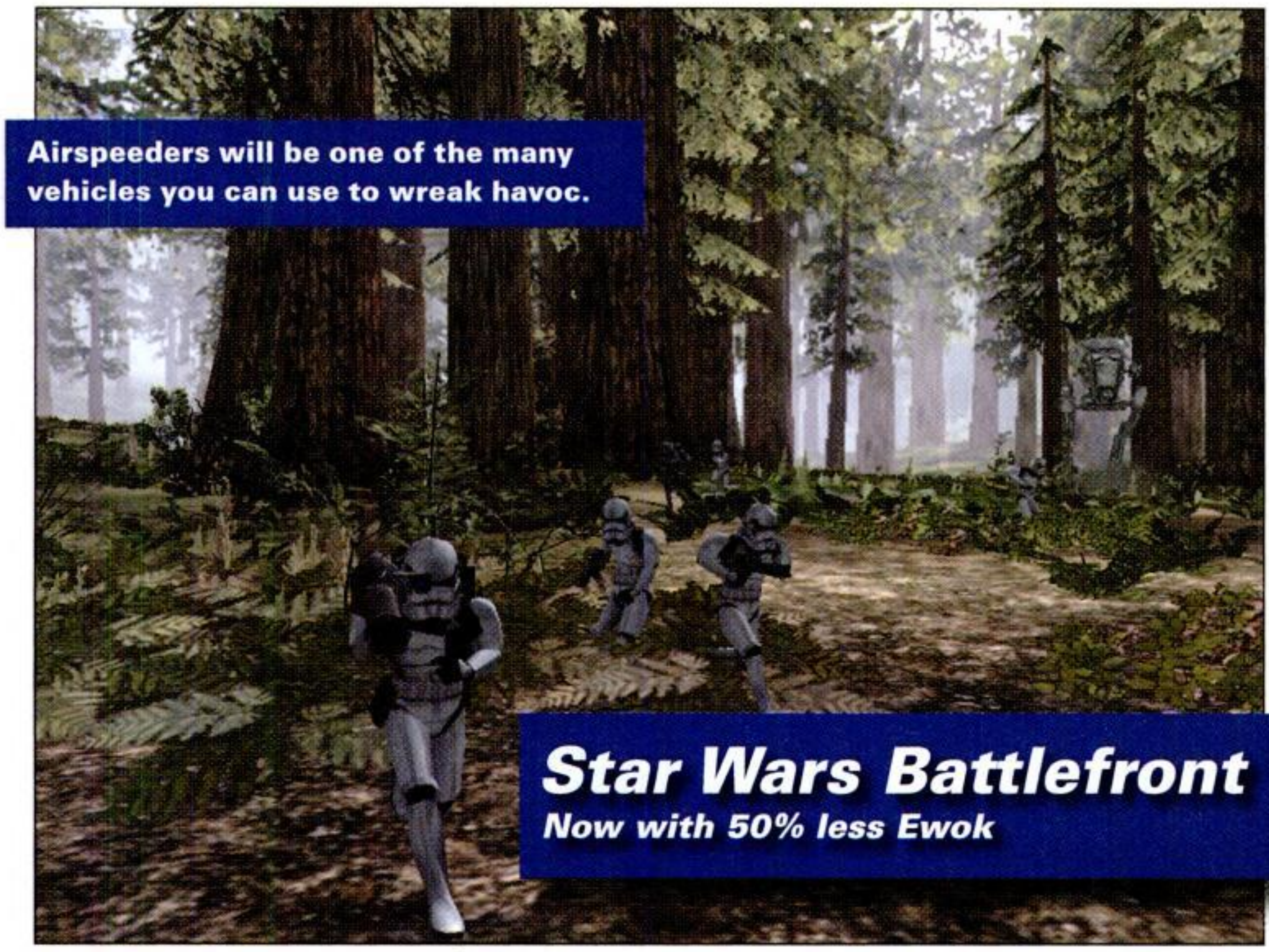
A wide variety of weapons, equipment, and vehicles will be at your disposal, and you'll be able to barter with other characters, selling your treasures for cash or trading them for better equipment. The weapons will be realistic depictions of real-world arms, such as Klashnikov AK rifles and FN Herstal machine guns.

Multiplayer will be included in the game, and up to 32 players will be able to clash—or cooperate—online.

**Developer: GSC Game World**
**Publisher: THQ**
**Web site: www.stalker-game.com**



The world's worst nuclear disaster site has been re-created to be big, bad, and oddly beautiful.



Airspeeders will be one of the many vehicles you can use to wreak havoc.

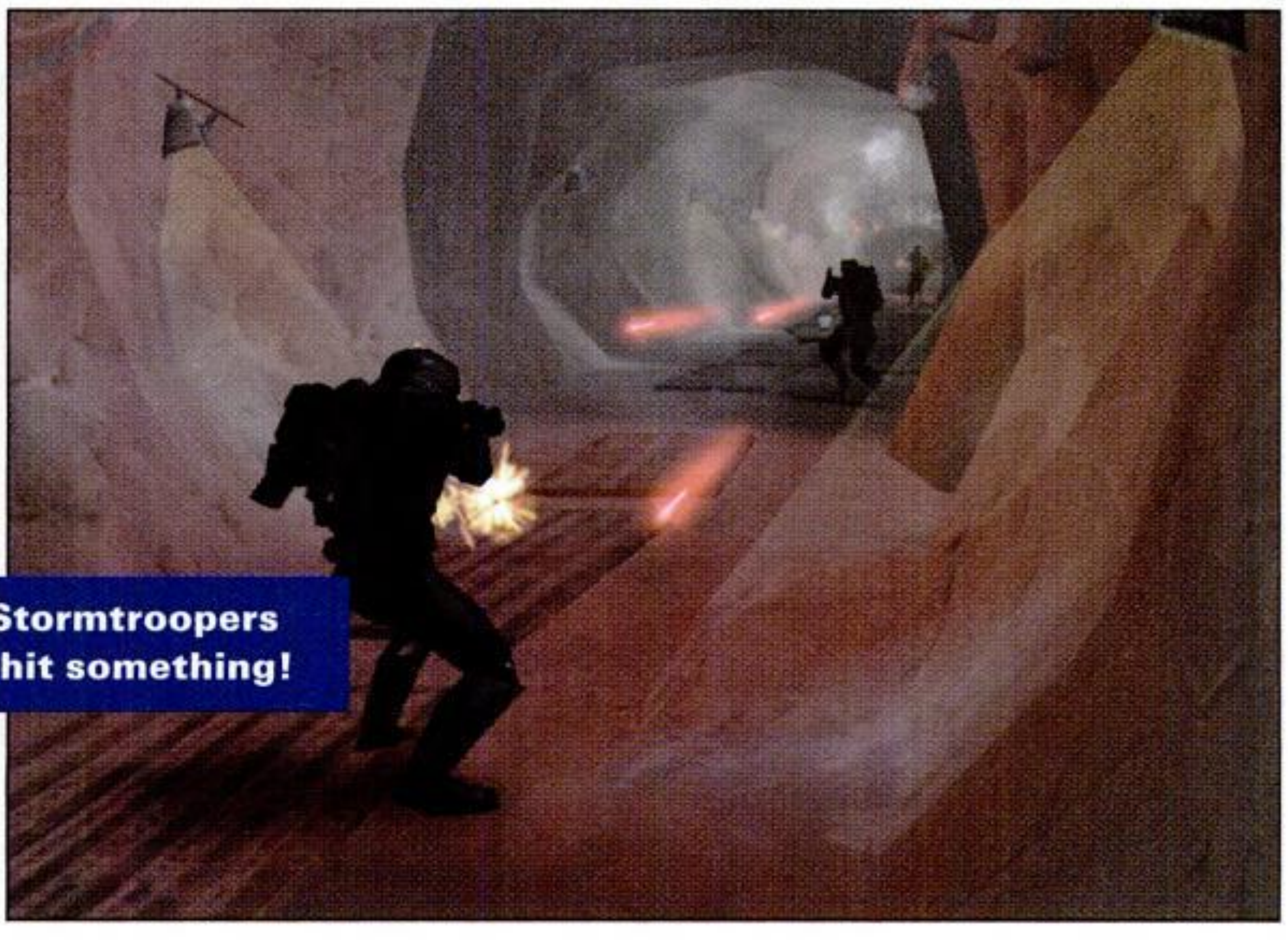
# Star Wars Battlefront

## *Now with 50% less Ewok*

After a slew of games that let *Star Wars* fans play as Jedi Knights, TIE Fighter pilots, and crafty smugglers, LucasArts will finally show players what it's like to be a lowly soldier in a galactic war. You will finally be able to fill the white boots of Imperial Stormtroopers in *Star Wars Battlefront*, a tactical FPS similar to the *Battlefield* series of games.

Like any good tactical shooter, *Battlefront* will have plenty of weapons, maps, and vehicles. And like any good *Star Wars* game, *Battlefront* will have plenty of weapons, worlds, and vehicles from the *Star Wars* universe. Most of the classic trilogy's vehicles will appear in one form or another. Rebels will be able to use Taun-Tauns and Snow Speeders, while Imperial Stormtroopers will have AT-ST walkers and Speeder Bikes at their disposal. You'll even be able to control droid tanks and STAPs from the prequel movies.

Four playable factions will be included, each with unique character classes, weapons, and vehicles. The factions will span the entire movie series, from the Old Republic's clone army to the Rebel Alliance's soldiers. The Battle Droids of the Separatist forces will also be available, as will the shiny, armored hordes of the Galactic Empire. Each faction will have its own classes, ranging from vehicle pilots to snipers. You won't be able to play as a Jedi Knight, but Force-wielding NPCs may make an appearance in the game. You'll be able to battle it out in just about every classic locale from the *Star Wars* universe, such as the forests of Endor and the icy tundra of Hoth. The fate of the galaxy will hang in the balance as Rebel soldiers and Imperial Stormtroopers, Republic Commandos and Separatist Battle Droids fight for supremacy.



This time, the Stormtroopers might actually hit something!

Developer: **Pandemic Studios**
Publisher: **LucasArts**
Web site: **www.lucasarts.com/games/swbattlefront/**

### Battlefield 2

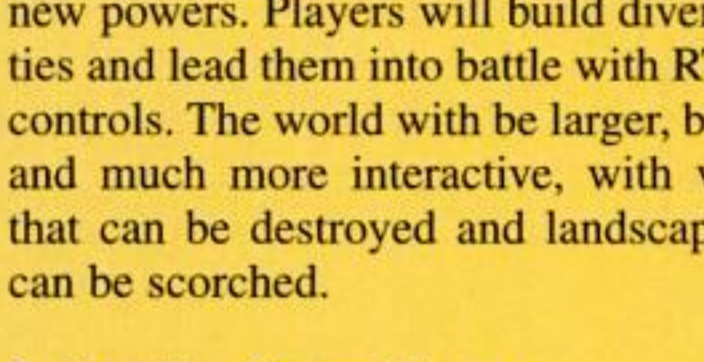
Abandoning the now-saturated WWII-themed genre of shooters that it helped inspire, *Battlefield 2* will depict modern warfare, using contemporary military equipment in realistic and topical settings. With 30 air, sea, and land vehicles, up to 100 players in a single battle, and maps that scale in size according to the number of players, *Battlefield 2* looks to be even more addictive than its predecessor.

Developer: **Digital Illusions**
Publisher: **EA Games**
Web site: **www.eagames.com/redesign/games/pccd/bf2/home.jsp**
ETA: **Q1 2005**

### Tabula Rasa

The *Ultima* series' own "Lord British" is creating this MMORPG, which has you explore an alien world while fighting for the future of Earth. A direct, simplified character-development system will let you seamlessly switch between play styles and skills as you play—without losing your progress.

Developer: **NCsoft**
Publisher: **NCsoft**
Web site: **www.playtr.com**
ETA: **Q1 2005**



### Dungeon Siege 2

The sequel to the most popular "action RPG" of the last few years promises deeper combat, gorgeous graphics, and incredible new powers. Players will build diverse parties and lead them into battle with RTS-like controls. The world with be larger, brighter, and much more interactive, with villages that can be destroyed and landscapes that can be scorched.

Developer: **Gas-Powered Games**
Publisher: **Microsoft**
Web site: **www.gaspowered.com/ds2**
ETA: **Spring 2005**

## Close Combat: First to Fight

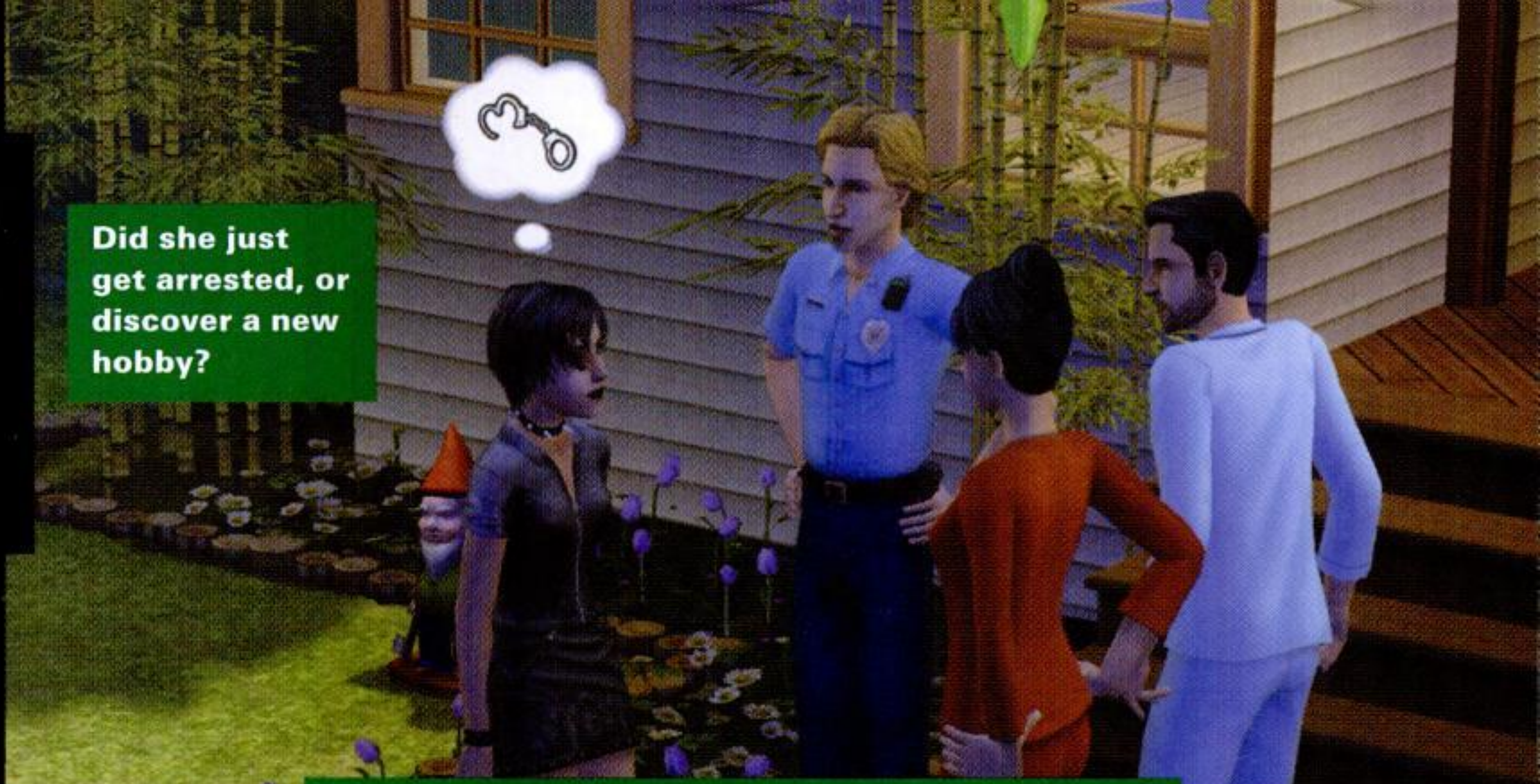
This team-based military shooter is being developed under the direction of actual United States Marines with the goal of giving you the most realistic combat experience possible—without actually putting you in danger of being shot. It looks like it is succeeding, too, as the U.S. Marine Corps will use the game as a training tool.

**Developer:** **Destineer**
**Publisher:** **Gathering**
**Web site:** **www.closecombat.com**
**ETA:** **September 2004**

## Star Wars Knights of the Old Republic II: The Sith Lords

The sequel to the smash hit *Knights of the Old Republic*, and our game of the year for 2003, will include seven new planets to explore, three Jedi classes, 30 new Force powers, and an enhanced combat system. KOTOR II's development is being entrusted to Obsidian Entertainment, and it will be their first title. That shouldn't be an issue, as members of the development team worked on several landmark RPGs, such as *Fallout, Icewind Dale*, and *Planescape Torment*, before joining Obsidian.

**Developer:** **Obsidian Entertainment**
**Publisher:** **LucasArts**
**Web site:** **http://www.lucasarts.com/games/swkotor_sithlords/**
**ETA:** **2005**



**Did she just get arrested, or discover a new hobby?**

## The Sims 2

### *Because living one life just isn't enough*

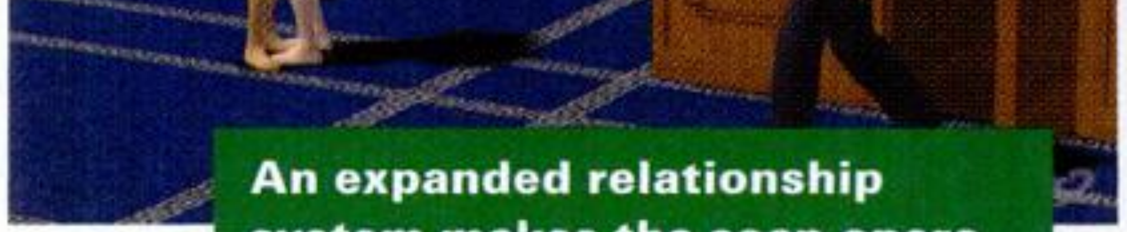
*The Sims 2* will be the first true sequel to one of the best-selling computer games of all time, and a bigger, more beautiful, much more intricate version of its beloved predecessor. Like its namesake, *Sims 2* will revolve around your "Sim-person," which you can shape from infancy to old age, determining how they grow and evolve (or devolve) through the course of their Sim-lives. How your Sims are raised will determine their attitude and habits as they grow older. Sims raised by nurturing parents will find it much easier to have fun and make friends as they grow up. Neglected children risk becoming antisocial, unhappy adults.

Naturally, you'll also be able to customize your Sim's home, creating the perfect kickin' bachelor pad, cozy ranch house, or partying fraternity for your Sims to "live" in.

The relationship system of the game will be more complex than the original's, with Sims capable of having affairs and getting divorced. Children and teen Sims will be able to hold slumber parties with their friends, while Adult Sims will "play" (PG-13 sex will be possible) with each other, opening up possibilities for some very WB-worthy drama.

Sims will grow realistically in the game, become adults, have children, and then become grandparents. Sims will have six phases of life: infant, toddler, child, teen, adult, and senior. So you'll see your Sims born, grow, and die of old age and other natural causes.

While *The Sims 2* won't be backwards-compatible with fan-created objects for the original *Sims*, Maxis will encourage players to develop items—Maxis plans to release a free stand-alone development tool by December, letting fans create their own content before the game even comes out. Expect to see official Maxis-created extras and player-created goodies, such as new tile-sets, skins, and interactive objects, available for download soon after the game launches.

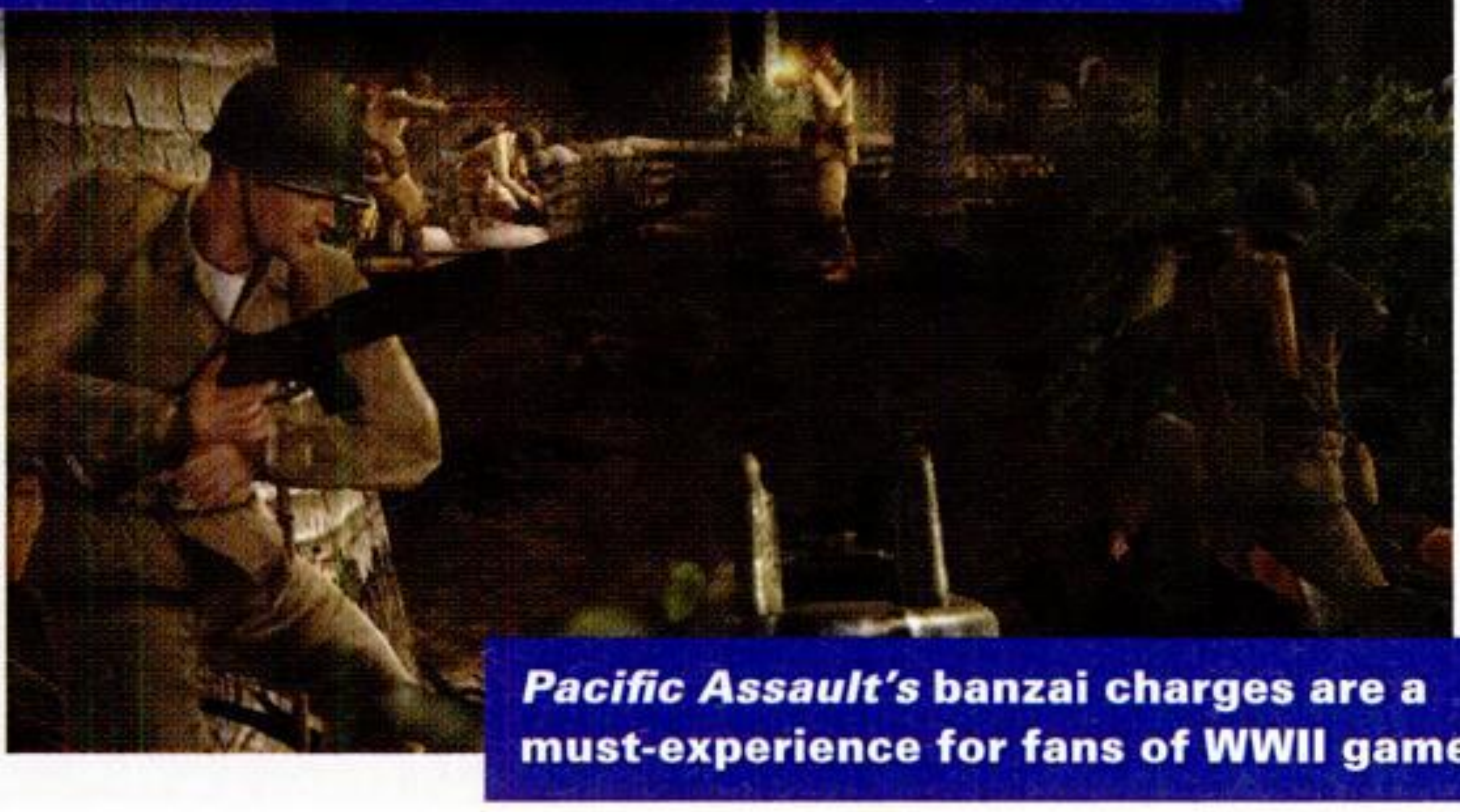


**An expanded relationship system makes the soap opera possibilities endless.**

**Developer:** **Maxis**
**Publisher:** **EA Games**
**Web site:** **thesims2.ea.com**

# Medal of Honor: Pacific Assault

**Finally, a WWII game not set in Europe!**



***Pacific Assault's* banzai charges are a must-experience for fans of WWII games.**

*Medal of Honor* kicked off a new World War II genre with the 2002 smash hit *Medal of Honor: Allied Assault.* Now, after two European-themed add-ons, the series finally lets you take the fight to the Japanese in *Medal of Honor: Pacific Assault.*

Like its title suggests, the game takes place in the Pacific theater of World War II. Over a 35-mission campaign, players will defend Pearl Harbor, attack Tarawa, and creep through Guadalcanal's dense jungles as they fight the Emperor's loyal forces.

*Pacific Assault* promises advanced AI that will result in computer-controlled enemies that use squad-based tactics, and even react emotionally to combat situations. Enemy forces may become scared if they start to lose, or will "banzai charge" your forces if their commander is killed or you are on the brink of victory.

The game will rely on AI rather than scripted events to control the gameplay, which should result in a high replay value—no mission should play the same way twice. Events will unfold differently depending on the choices you make and the dynamic reaction of enemy AI.

*Pacific Assault* will feature a complex multiplayer mode, with multiple game types and class-based gameplay. A new game type called "Invader" will be introduced in which opposing teams advance into enemy territory, claiming objectives along the way. The multiplayer modes will emphasize cooperation between teammates as they work together in squads to achieve victory.

Developer: **EA LA**
Publisher: **EA Games**
Web site: **www.eagames.com/official/moh/**

# Star Wars: Republic Commando

**Uncle Palpatine wants you!**

**While this game slipped to a Spring release, it should be worth the wait.**

*Star Wars* enters the squad-based combat realm in *Republic Commando,* which at the very least offers the gritty portrayal of the *Star Wars* universe we've been hankering for since *The Empire Strikes Back.* Better yet, our initial playtests suggest the game may successfully blend the best elements of the traditional tactical FPS such as *Rainbow Six* and more visceral shoot 'em-up, like *Halo.*

You fill the boots of the commander of an elite Clonetrooper unit, fighting for the security of the Republic. Using LucasArts' new "One Touch Squad Control" scheme, which is a simplified control system for issuing orders to your squad-mates, you'll be tasked with achieving a variety of missions objectives against hordes of challenging enemies—both old and new. Via an amazing 3D HUD rippling with special effects, you can quickly and simply issue orders to your fellow Clonetroopers to set and blow breaching charges, toss grenades, target specific enemies, take cover, and more.

*Republic Commando* will give *Star Wars* fans a great sneak preview of Episode III, featuring locations and characters from the new movie. For instance, the oddly-named General Grevious, Episode III's new villain, will appear in the game.

Players will see plenty of familiar *Star Wars* locales as well, from the forests of Kashyyyk to the wastelands of Geonosis. Prequel creatures like battle droids and Geonosian warriors will present a constant danger to the elite Clonetrooper Commandos, which we saw in action for the first time in Episode II.

You'll have to wait a little longer for this one—it slipped to an "early 2005 release" at press time. However, our early playtests indicate the wait will be well worth it. ■

Developer: **LucasArts**
Publisher: **LucasArts**
Web site: **http://www.lucasarts.com/games/swrepubliccommando/**

**This game has the gritty *Star Wars* look we've been waiting for.**

# Hardcore

# Hardware

## Don't let *Half-Life 2* throttle your PC! Use our extensive review guide to make sure you've got the hardware to run it—and any other 3D game—in style.

We've all experienced it at one point or another: A hot new game hits shelves, we run out and buy it, wait impatiently for it to install, and then discover it runs like a slideshow on our machine, which we previously thought was up to handling *any* challenge.

Sometimes, if we're really lucky, the solution is as easy as making a few performance tweaks, such as over-clocking our CPU or videocard. More likely, a minor hardware upgrade—more RAM perhaps—is the prescription. However, when it comes to genre-bending new 3D games such as *Doom 3* and *Half-Life 2*, the fix is usually much more drastic: a complete system makeover, a new $500 videocard or monitor, or even the need to buy a spanking new system.

What's surprising is, we don't mind putting up with this "hassle." If we did, we'd all own an Xbox and only use our PCs for *Word*, *Excel*, email, surfing the web, and processing our digital pics. Keeping up with the PC upgrade race is a challenge we embrace: We chortle with manic joy whenever a new piece of hardware ekes out an extra frame or two per second in the current game-of-the-moment.

However, sifting through shelves bulging with similar hardware offerings can make it very difficult to decide exactly *what* to buy, and this is definitely the least fun part of the upgrade process. That's where we—the editors of *Maximum PC*—step in. We've done all the legwork so that you don't have to.

We spend long hours putting all the latest and greatest (and not so great) PC hardware through rigorous testing in our labs. One reason is to justify our exorbitant salaries to our bosses (okay, so we wish). The other is so that we can identify for you which new LCD or CRT monitor, new ATI or nVidia videocard, off-the-shelf gaming rig, laptop, speakers, mouse, and even mouse pad, is going to perform the best for you.

In the following pages you'll find the crème de la crème of all the newest hardware you need to get the utmost enjoyment out of today's 3D games. Whether you're in search of a complete new gaming desktop or something as seemingly innocuous as a new gaming mouse and pad, we've got you covered. Be forewarned, however: This is not a compilation of the least expensive hardware options out there. In typical *Maximum PC* style, we determine the best hardware from a performance perspective, with cost being a secondary concern. In the world of PC hardware, the mantra "you get what you pay for" is usually true. So, without any further ado, let's start shopping!

# CPU Showdown: AMD vs. Intel

## We examine the role of today's CPU and help you choose the right proc for your gaming system

The powerful Graphics Processing Units (GPUs) housed on today's new videocards are taking on more and more of the roles that have traditionally been reserved for a PC's host CPU. However, the CPU is far from irrelevant—it's simply doing different things nowadays.

For starters, while it may no longer be performing triangle calculations to build 3D characters, or munching the mathematical algorithms for graphics processing, it is still doing all the heavy lifting for the artificial intelligence routines. So, when you toss a barrel down a hill in *Far Cry*, for example, it's the CPU that is doing the physics calculations that make the barrel carom realistically off dirt, trees, rocks, and bad guys.

The CPU can also make a huge impact when you load your game, which use megabytes of compressed files to store textures, sounds, and maps. The faster your CPU, the faster it decompresses these files, and the faster you'll be playing your game. In fact, if you want a competitive edge in online matches, a faster CPU usually means you're the first person to spawn on a map so you can grab the best weapon.

As evidenced by *Doom 3* (see story on page 50), the CPU is also increasingly being tapped to handle audio chores—instead of your fancy add-in SoundBlaster Audigy 2. Instead of relying on expensive digital-signal processors on soundcards to calculate where to place an audio effect, or how much 3D effect to apply to a gunshot, the majority of today's PCs use onboard audio chipsets, which rely almost entirely on the CPU.

### What Means Megahertz?

We know it sounds contradictory, but a CPU's megahertz ratings do not matter... yet they do. For example, you should not assume that a 3.2GHz PC is going to be a faster gaming rig than a 2.2GHz PC. At the same time, it's not safe to assume that a 3.2GHz Pentium 4 won't be any faster in gaming than a 2.8GHz Pentium 4. Got it?

intel
pentium 4

**Intel's fastest processors are based on the ballistic Socket T chips, which use the Prescott core at 3.6GHz and 3.8GHz.**

Megahertz matters when comparing a CPU in the same family. A 3.2GHz Pentium 4 is going to be faster than a 2.8GHz Pentium 4. A 2.4GHz Athlon 64 FX-53 is going to be faster than an Athlon 64 FX-51.

Megahertz doesn't matter when comparing CPUs between brands and families. Which is faster, a 2.8GHz Pentium 4 using the Prescott core or a 2.2GHz Athlon 64? In an overwhelming amount of games, the Athlon 64 will be faster.

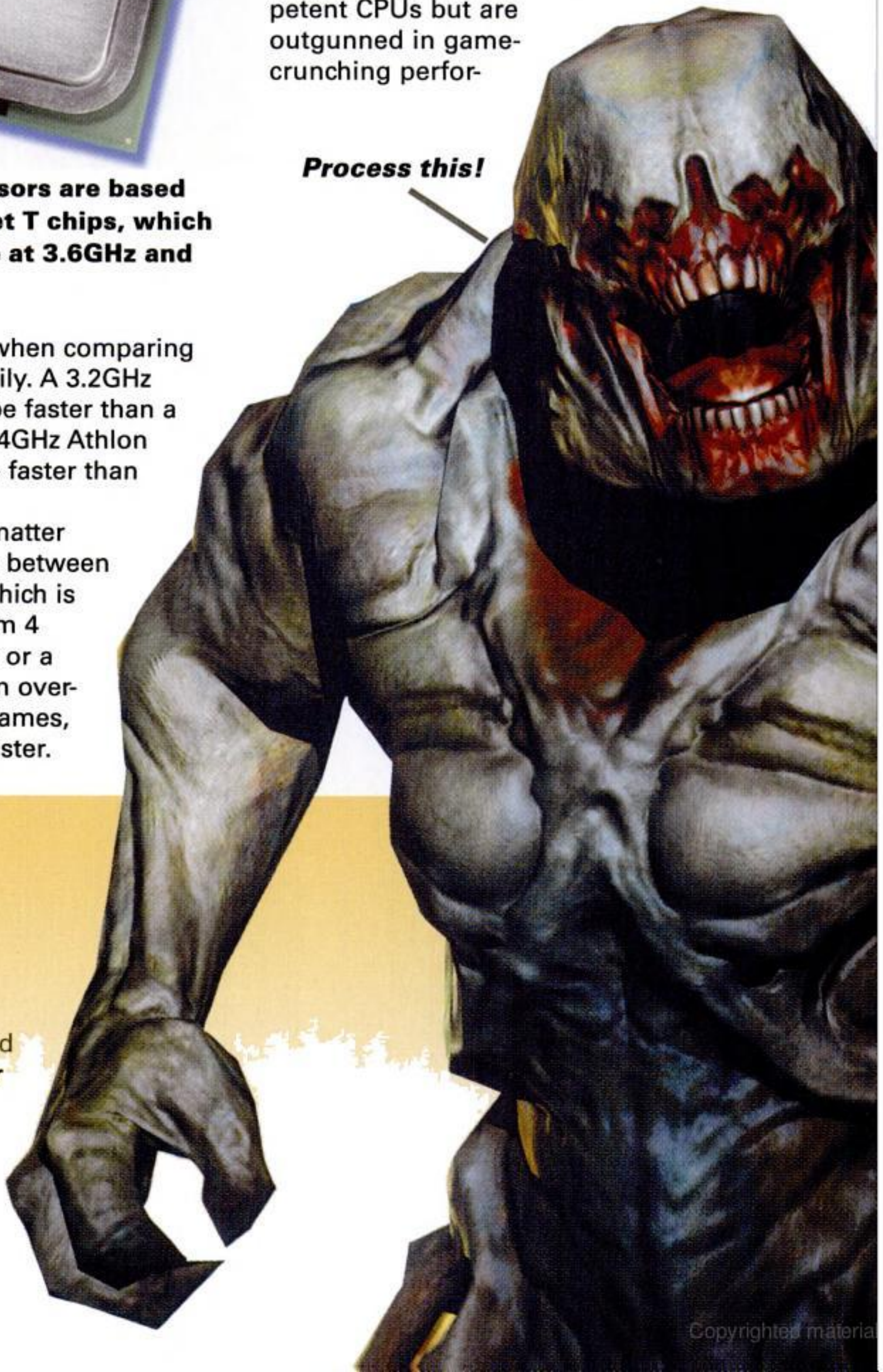
So don't be wooed simply by the clock speeds. To truly understand it all, you'll need to delve deep into the CPU's specs.

### Intel's Garage

Intel's lineup of desktop CPUs is confusing to say the least. Although there's still only the Pentium 4 brand, there are several "cores" in each line that make the CPUs very different. The oldest is the Pentium 4 based on the Northwood core. It came in speeds from 2GHz to 3.4GHz and initial bus speeds in the 400MHz range. The bus speeds refer to how fast the CPU can spit data out to the motherboard. The faster the bus speed, the faster data can flow. Intel's bus speeds come in 400MHz, 533MHz, and 800MHz (and a 1,066MHz version is on the way).

Northwood P4s are competent CPUs but are outgunned in game-crunching perfor-

***Process this!***



## *Intel Buying Tips*

System builders and buyers should be aware that Intel recently introduced a new CPU interface called the LGA775, or "Socket T." This socket is the future of Intel's platform and should last for at least two years. Unless you're price-conscious, we'd recommend that you select an Extreme or Prescott processor in LGA775 trim. Then look at the proc's core, clock speed, front-side-bus speed, and process size (90nm or 130nm) to determine the best bang for your Intel buck. The process size helps determine whether the CPU is a Prescott (90nm) or Northwood (130nm) and refers to the actual size of the transistors used to build the chip.

mance by AMD's Athlon 64. Intel's newer Pentium 4 Extreme Edition at 3.2GHz and 3.4GHz is more competitive. Much of AMD's performance comes from the on-die memory controller (more on that in the AMD section). Since Intel doesn't have an on-die memory controller, it compensates by adding cache, which is a small bit of super-fast RAM that is used to temporarily store data and instructions the chip needs, to its Extreme-branded chips.

The Northwood has 512KB of L2 cache. The Extreme Edition has 2.5MB of cache. This boost increases the pool of data and instructions that can be lined up to feed the hungry proc, and it mitigates the slower memory performance of the Pentium 4 when compared with the Athlon 64. The Pentium 4 Extreme Edition is extremely expensive at $990 each versus $750 each for the Athlon 64. Still, the P4EE is generally regarded as Intel's fastest gaming CPU.

This title may not last for long, however, as Intel's newest CPU, the Prescott, has come into its own. Built using smaller circuits than the Northwood, the Prescott was considered a dog when it was first introduced at 3.2GHz. Designed to run at speeds higher than 4GHz, the 3.2GHz Prescott was almost like a race car that can barely idle because it's intended to run at 200MPH not 2MPH. Now at 3.6GHz and soon to be 3.8GHz, the Prescott is considered to be the better of the two chips. Unfortunately, Intel is using the Prescott cores at both high and low speeds. If we thought it was a dog at 3.2GHz, you can imagine where the performance is at 2.4GHz. If you have to have Intel and you can only afford a processor in the 2.4GHz to 3.2GHz range, get one based on the Northwood core. If you're buying in the 3GHz to 3.4GHz range, the Extreme Edition will get you the best performance. At speeds greater than 3.6GHz, the answer is Prescott.

## AMD's Stable

AMD has a healthy stable of new processors, as well as a few older CPUs that are on the way to the glue factory. The Athlon XP is still the company's top seller, due to its price/performance ratio, but we'd recommend that you look at the newer 64-series of procs, the Athlon 64 and Athlon 64 FX.

AMD
64
Athlon FX

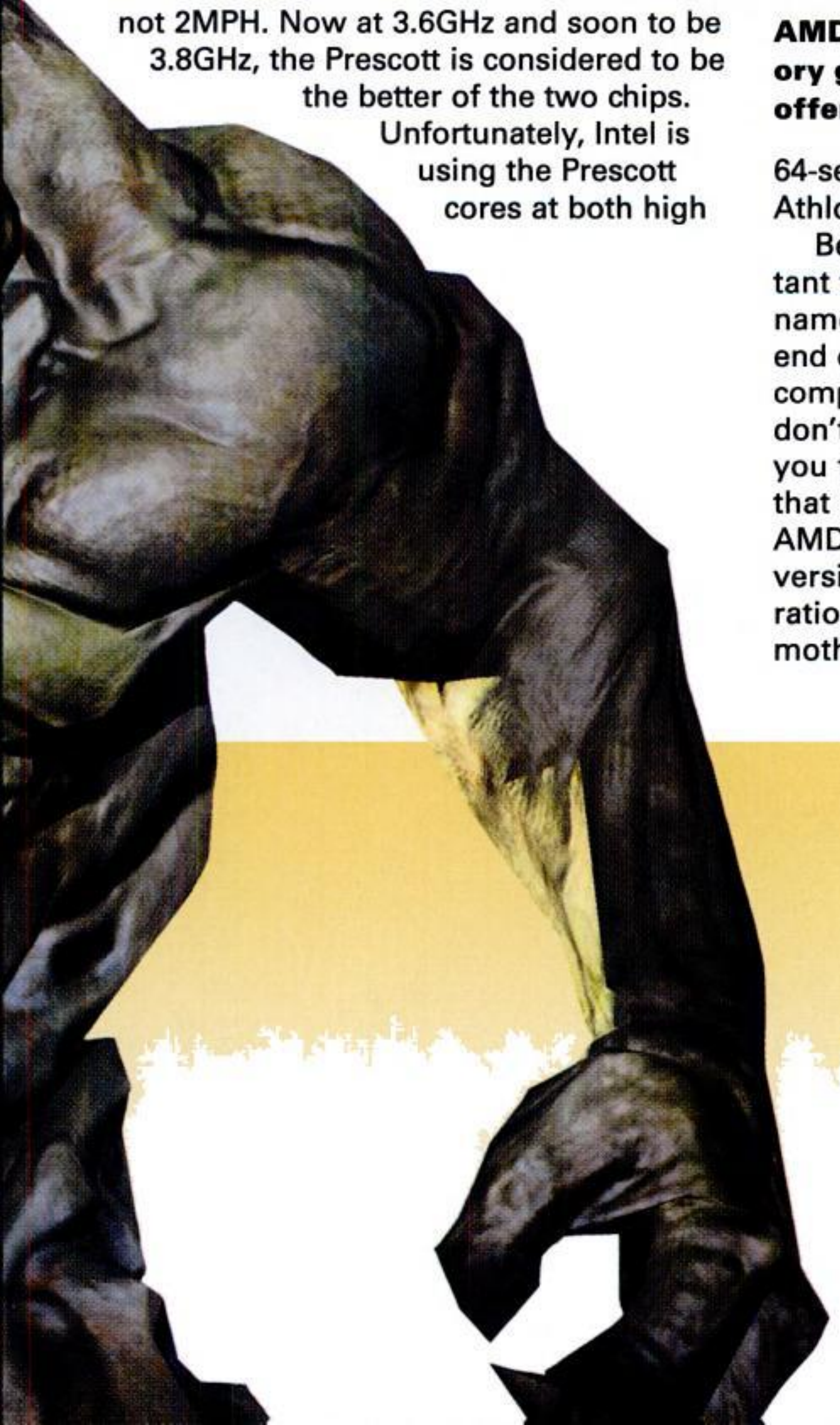
**AMD's Athlon 64 FX-53 on-die memory gives it the edge over Intel's CPU offerings.**

Before we get into these, it's important that you filter out the similarly named AMD chips that are nearing the end of their life cycles. If you want the company's top-of-the-line Athlon 64 FX, don't let a vendor or store owner steer you toward a system or motherboard that uses Socket 940. It's a dead-end as AMD has no plans to offer higher speed versions of the FX in Socket 940 configurations. Likewise, Socket 754 Athlon 64 motherboards can't be upgraded to support FX processors. For the best upgrade path and performance, we recommend sticking to Socket 939 motherboards and processors.

You should also bypass the Athlon XP—it just can't hang anymore. The Athlon XP was a great chip two years ago, and it deserves to have its jersey hanging on a wall, but AMD's decision to integrate a memory controller into its newest CPU cores has proven to be a huge boon for gaming.

The memory controller is the Athlon 64's "secret sauce," and it consists of the chip components that "talk" to the RAM residing on a motherboard. In Pentium 4 machines and Athlon XP machines this controller sits on the motherboard and can only run at a few hundred megahertz. In the case of the Athlon 64 and Athlon FX series, the controller is actually *inside* the CPU core. This means that if the CPU runs at 2.4GHz, the memory controller runs at 2.4GHz. And since signals have only about one nanometer to travel instead of two inches as in the P4 or Athlon XP, latency is also greatly reduced. For this reason, most processor pundits—including *Maximum PC*—label the A64 as the king of CPUs for gaming performance. However, that doesn't mean the Pentium 4's totally out of the race. Both Intel's and AMD's fastest procs give you plenty of performance for today's games. However, we give AMD the edge in both the benchmarks and in general playability.

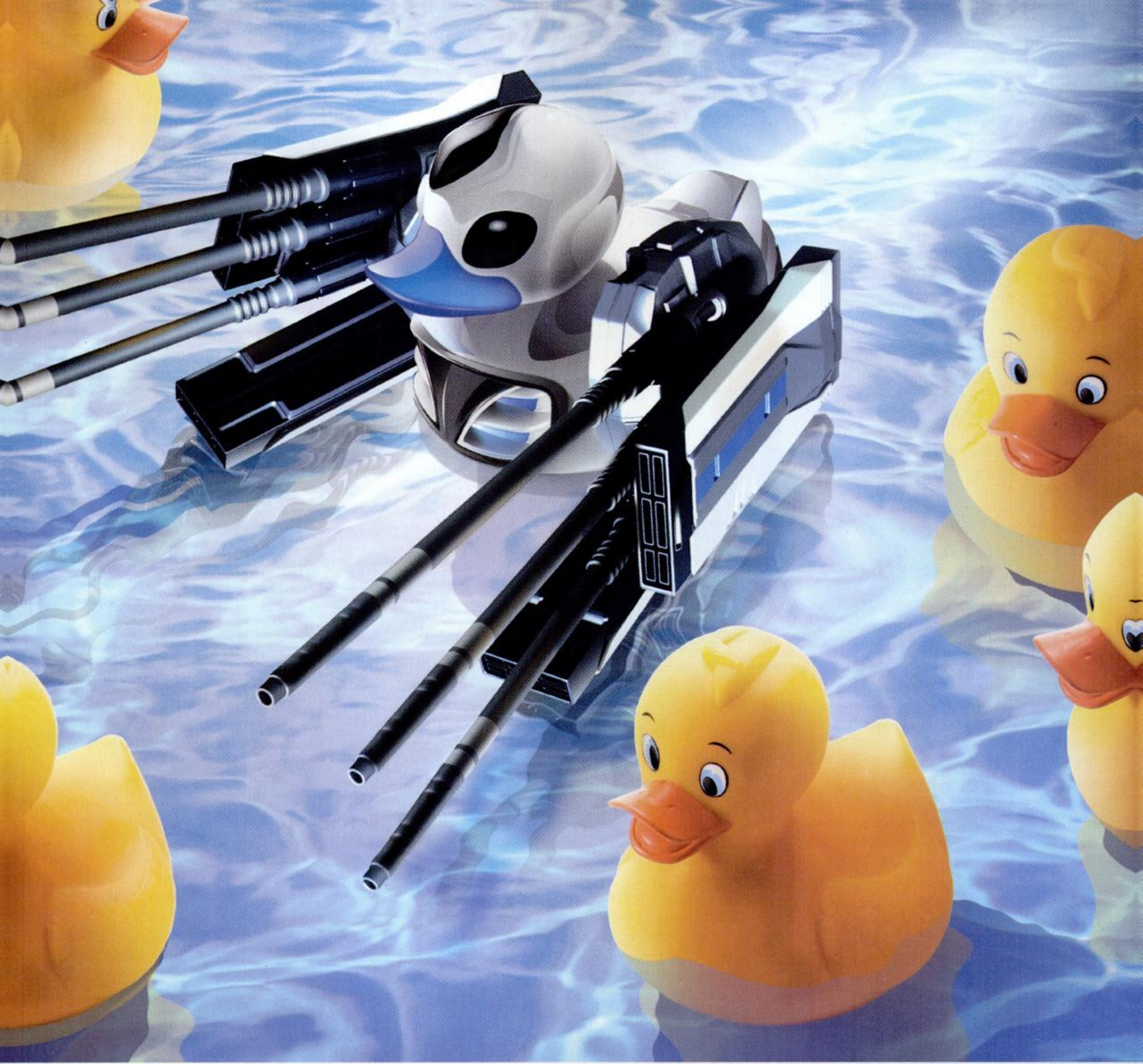
AMD has two top CPU brands, but they're actually one-in-the-same. The Athlon 64 FX-53 runs at 2.4GHz and has 1MB of L2 cache. The Athlon 64 3800+ (the 3800+ is to help remind consumers that it's the equivalent of a 3.8GHz Pentium chip) runs at 2.4GHz but has only 512KB of L2 cache. The difference between the CPUs is that AMD tests one to make sure all of its 1MB cache functions. If the cache is tested and fails, AMD retests that CPU to see if it will pass at 512KB. If it passes, it becomes a 3800+. This may sound a little shady, but it's the way of the CPU world.

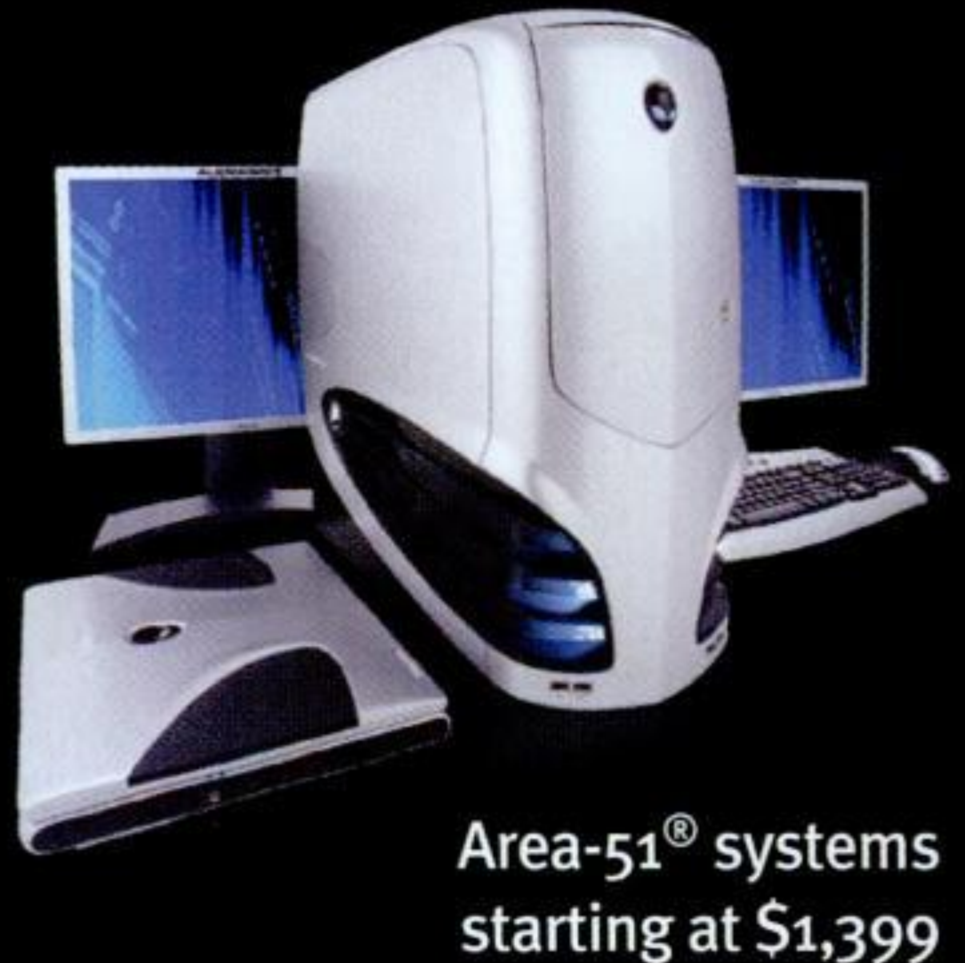


## AMD Buying Tips

Naturally, AMD's top performer is the FX-53 with its 1MB of onboard cache. Budget shoppers are well-served by the Athlon 64 3500+, which operates at 2.2GHz. If you can't afford this chip, then you may have to step down to a Socket 754 version, which represents a good compromise in terms of price and performance.

Be aware of AMD's penchant for issuing the same model numbers for CPUs that are *very* different. AMD offers an Athlon 64 3200+ that runs at 2GHz and has 1MB of L2 cache, while also offering another Athlon 64 3200+ at 2.2GHz but with only 512KB of L2 cache.





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# Desktop Deathmatch

## We put 3 high-end desktops through the mill to find out which ones have big league game.

Does your PC make *Far Cry* look more like a *PowerPoint* presentation than a 3D shooter? Are you playing *Doom 3* at camera-phone resolutions? Then it's time to beef up with a new PC. Presented here are two of the fastest machines to survive the latest torture tests inside *Maximum PC*'s labs, plus one that represents the best "bang for your buck" potential.

### Alienware ALX: The King of Kings

Although Alienware is one of the oldest and most respected names in performance-gaming PCs, the company has had a tough time shaking the "mainstream" label slapped on it a couple of years ago.

To say the company is a little touchy about the mainstream moniker is an understatement. As a countermeasure, Alienware has introduced its new ALX series of machines, which are intended to help it reclaim any hardcore ground lost to Falcon Northwest and Voodoo PC.

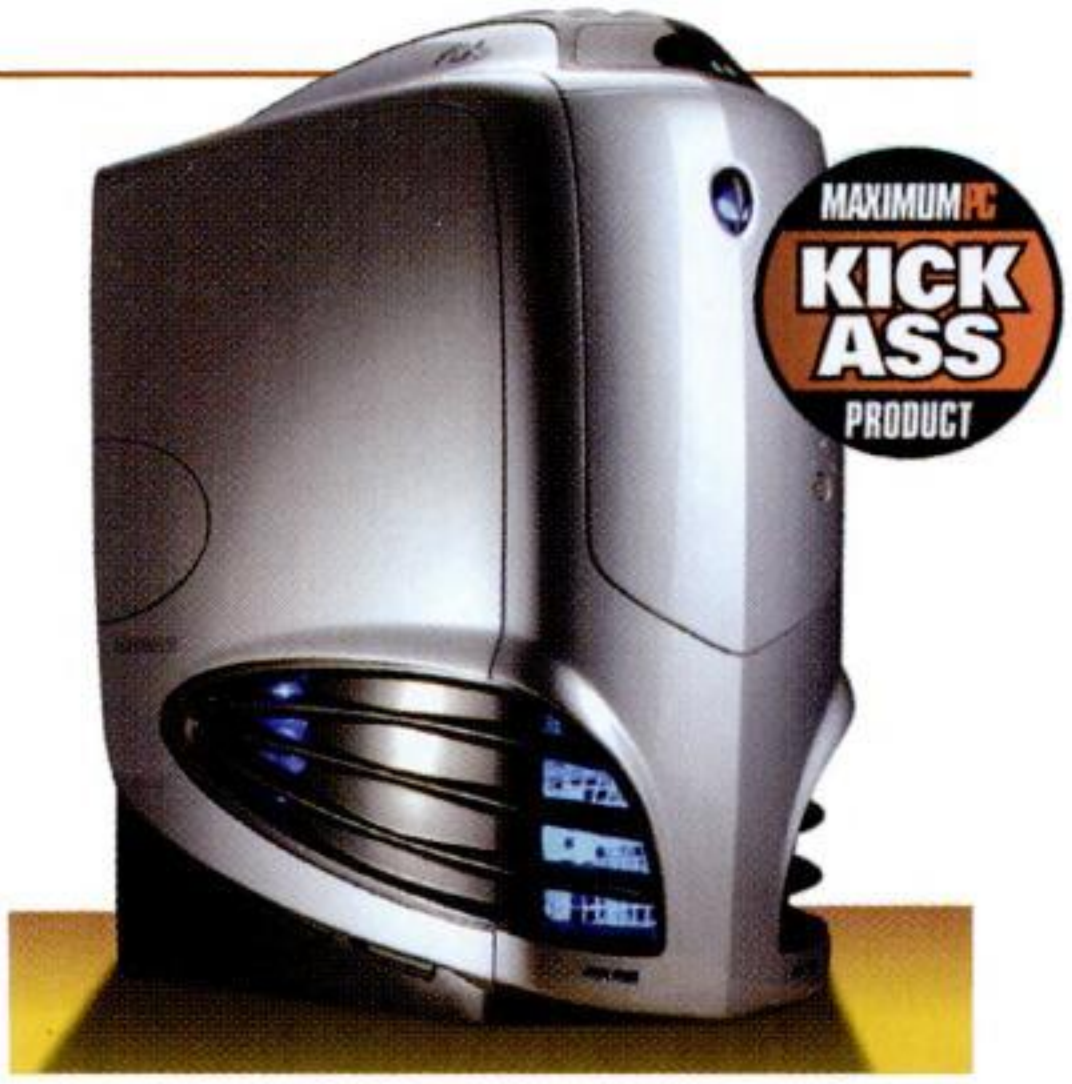
Although we hoped to see a rig with Alienware's upcoming dual-videocard solution, the company instead sent us an Athlon 64 FX-53 in a new proprietary water-cooled ALX case. When we saw that the Athlon 64 FX-53 had been overclocked from 2.4GHz to 2.6GHz, we knew the ALX would be a formidable force. And Alienware didn't just overclock the CPU; it also took the GeForce 6800 Ultra from a stock clock of 425MHz to 450MHz.

Of course, the real showdown occurs in our Lab's benchmarking tests, and in that respect the ALX and Athlon 64 FX don't disappoint. The ALX won the majority of our benchmark rounds with its 2.6GHz FX. (Although Falcon Northwest's Mach V ran a close, close second.)

The ALX's water-cooling system lets you manually choose one of the three fan speeds to meet your conditions. While it's very quiet on the lowest setting, the fan churn of the highest setting made it the loudest machine in our deathmatch.

The case is a slight modification of the standard Alienware Predator case, with a little extra headroom for the water-cooling and blue LED (which tells you what temperature the proc is running at) embedded in the system's "forehead." While we still love the unique look, we weren't too happy with our review unit. We found the small side-cover difficult to close, and our front-door latch broke the second day of testing. Our ultimate chassis for this rig would be the Predator case cast in aluminum; while expensive, that would be one hell of an enclosure.

Still, performance is what matters most. And the ALX is the fastest game rig at the moment.



**The ALX's Predator case is certainly unique, but a little under-built.**

**Alienware ALX**
MAXIMUM PC VERDICT 9
$4,995, www.alienware.com

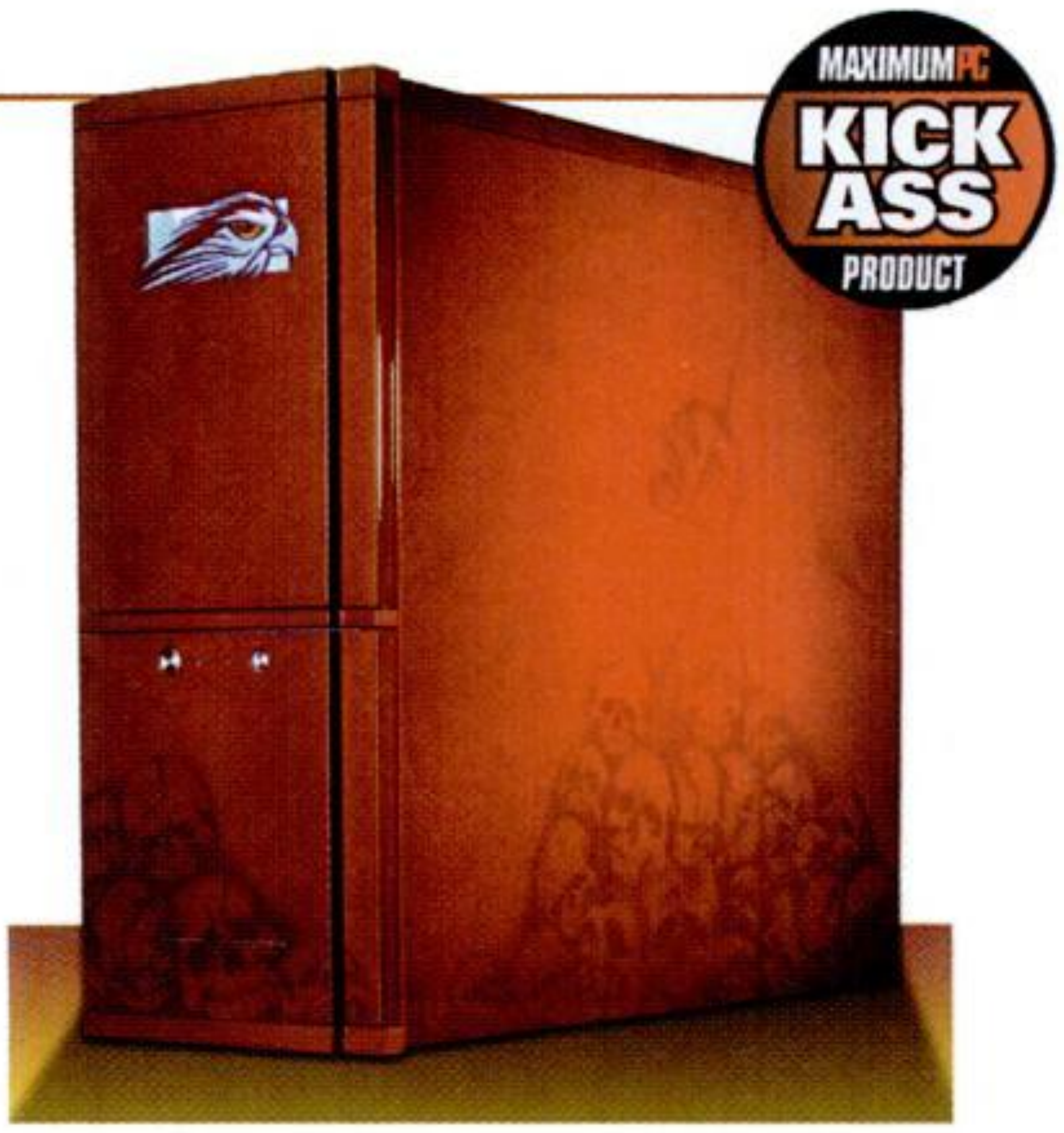
### Falcon Northwest Mach V Icon Exotix: Fast, Pretty, Pricey

Falcon Northwest likes to say it was the very first U.S. company to build PCs that cater to gamers. This is a legitimate claim, and as such, the old-time gaming-PC shop has an arsenal of tricks in its bag. A shining example of Falcon's prowess is the Mach V Icon Exotix.

Instead of using the popular Athlon 64 FX, Falcon attempted to out-muscle its competitors with a highly over-clocked Pentium 4. How high? How does 4.28GHz sound? That's well beyond the clock speed we hit with last month's over-clocked Dream Machine 2004 (which ran at 3.97GHz). But Falcon has two advantages: The first is a new custom-designed water-cooling scheme that vents hot air out the top of a Silverstone Nimiz case through a massive radiator. The second is the base CPU. We started with a 3.6GHz Pentium 4 Extreme Edition in the DM2004; Falcon started with a 3.8GHz P4 for this monster rig. You haven't heard of a 3.8GHz P4? Neither had we until Falcon's PC arrived.

The 4.28GHz P4 is locked into a Socket T in an Asus P5AD2 Premium mobo that's stuffed with 2GB of DDR2. This is the same board we used in the Dream Machine, and it continues to wow us

**Falcon Northwest Mach V Icon Exotix**
MAXIMUM PC VERDICT 9
$7,300, www.falcon-nw.com



**The paint job is called "red death" and features a subtle pile of human skulls**

with its dual GB LAN and onboard Wi-Fi. The exotic, hot-rod-worthy paint job is eye-catching. Finally, the Falcon actually gave us the least problems on boot we've seen in some time for an overclocked PC.

Our only qualm with the Mach V is its hefty price. We're used to seeing big price tags on systems, but this one pushes the top end at $7,300. (You can shave a grand off the price if you forego the paint job.) Regardless, Falcon Northwest continues to impress us with its technical prowess. If money is no object, this is clearly the PC for you.

## ABS ULTIMATE X6: A Speedy Value

ABS isn't typically mentioned in the same breath as Falcon Northwest, Voodoo, and Alienware. However, it does carry a reputation for providing quality parts at low prices, and its Ultimate X6 PC is a shining example of why.

Like the Falcon rig, the Ultimate X6 features forward-looking PCI Express support, Corsair Micro DDR2, the de rigueur Western Digital Raptor RAID array, and nVidia's GeForce 6800 Ultra. ABS chose not to overclock the CPU and videocard; the latter runs the default clock speeds: 400MHz in the core and 1,100MHz memory. There's no soundcard included, but ABS can argue that the onboard Intel HD Audio implementation is at least spec'd to support 24-bit/96kHz audio.

The X6's Lian Li PC-V1000 case really stands out. Screaming "G5 envy," the PC-V1000 is durably constructed and features an inverted motherboard design that places the GPU upside-down in an effort to increase the cooling of the videocard. With the exception of the sharp, serrated edges, we like the case—it offers slots for no less than six hard drives, space ABS takes advantage of by supplementing the Raptor's fast-but-sparse 140GB array with a 200GB Maxtor.

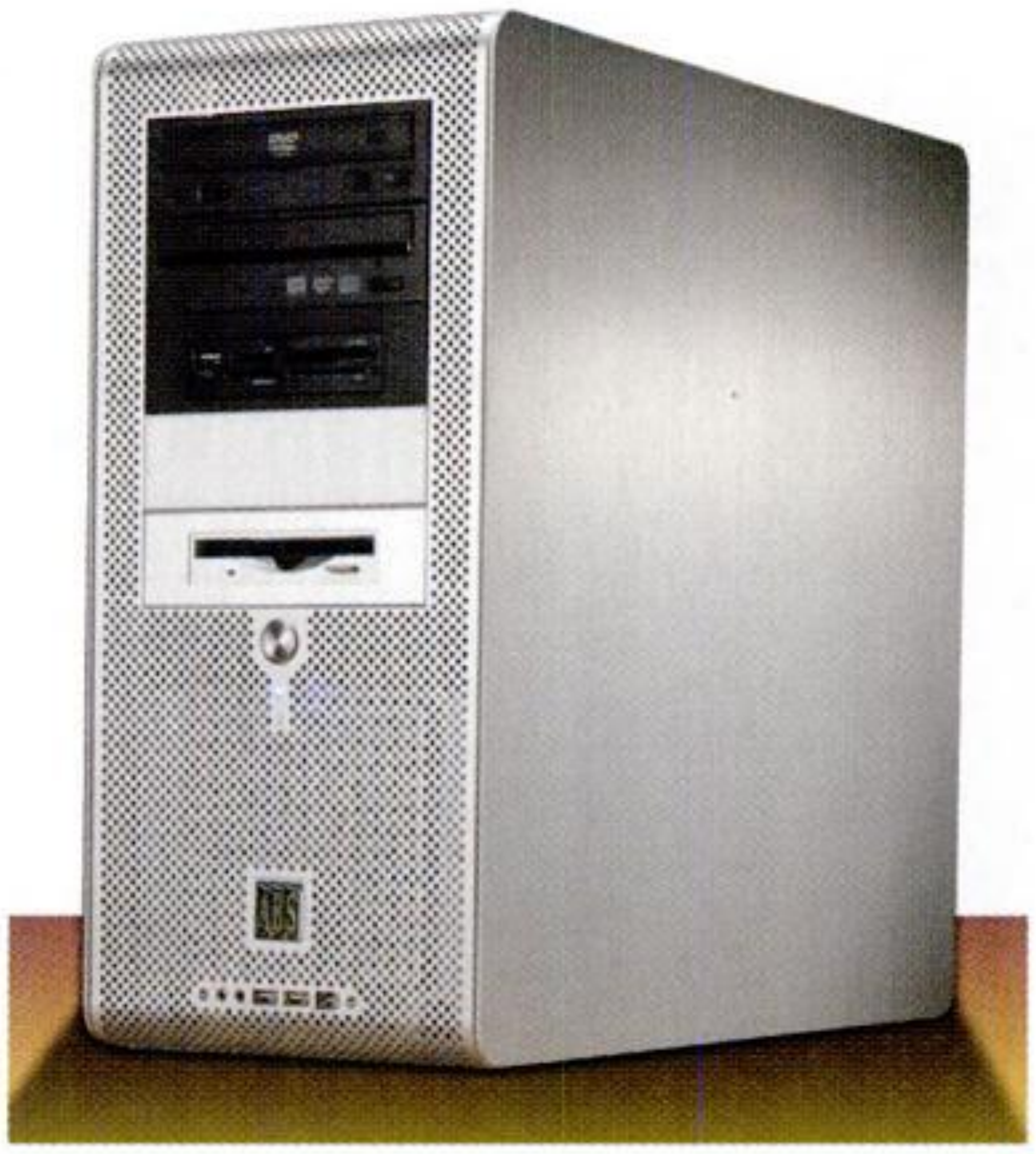
Aside from its slightly sluggish performance, our main criticism of the X6 is that its wiring job and other pre-shipping preparations could be better. We were completely puzzled and annoyed by the lack of USB support: it appears that someone in manufacturing disabled the USB ports. Compounding this problem, the BIOS is password-protected. That's not a good sign.

Despite these shortcomings, the Ultimate X6 boasts an impressive price-to-performance ratio. Overall, it's a great value. But the P4 Extreme is clearly outclassed by the Athlon 64s and the highly overclocked P4 in Falcon Northwest's Mach V.

**ABS Ultimate X6**

**MAXIMUM PC VERDICT 7**

$3,300, www.abspc.com



**The ABS X6 is a winner--once the USB issues are resolved.**

| MAKE | ALIENWARE | FALCON NORTHWEST | ABS |
|---|---|---|---|
| MODEL | ALX | Mach V | Ultimate X6 |
| CPU | 2.6GHz Athlon 64 FX-53 | 4.28GHz Pentium 4E | 3.41GHz Pentium 4EE |
| RATED CPU | 2.4GHz Athlon 64 FX-53 | 3.8GHz Pentium 4E | 3.4GHz Pentium 4EE |
| MOTHERBOARD | ASUS A8V | ASUS P5AD2 Premium | ASUS P5AD2 |
| CHIPSET | VIA K8T800 Pro | Intel 925X | Intel 925X |
| PSU | PC Power TurboCool 510 Deluxe | Enermax 550 | Antec TruePower 480 |
| RAM | 1GB DDR400 | 2GB DDR2 / 533 | 1GB DDR2/533 |
| GPU MAKE/MODEL | GeForce 6800 Ultra | GeForce 6800 Ultra Express | GeForce 6800 Ultra Express |
| GPU CLOCKS | 450 / 1100 | 440 / 1100 | 440 / 1180 |
| HD | 2 WD 740GD | 2 WD 740GD<br>250GB WD SATA | 2 WD 740GD<br>200GB Maxtor |
| HD CONFIGURATION | RAID 0 | RAID 0 | RAID 0 |
| OPTICAL 1 | Plextor Premium CD-RW | Sony DRU-700A Toshiba M1712 | JLMS-HD1665 |
| OPTICAL 2 | Plextor PX-712A |  | Plextor PX-712A |
| AUDIO SYSTEM | SB Audigy 2 ZS | SB Audigy 2 ZS | Onboard |
| JEDI ACADEMY (1600X1200, 4XAA) | **143.3** | 140.1 | 118 |
| HALO 1.013 (1600X1200, 4XAA) | **71.3** | 69.11 | 59.06 |
| UT2003 FLY BY (1600X1200, 4XAA) | **230** | 223 | 205 |
| DOOM 3 (1600X1200) | 72.0 | **72.2** | 77.1 |
| FAR CRY (1600X1200) | **68.8** | 67.2 | 65.3 |

# Battle of the $500 Videocard Titans

## These high-end videocards cost a lot, but the performance is outstanding

Here we are again. Two mortal combatants, squaring off in the death-ring that is the *Maximum PC* testing Lab. In the green corner, we have the Leadtek Winfast A400 Ultra TDH. In the red corner, Visiontek's X800 XT Platinum Edition. Both cards represent the pinnacle of 3D rendering technology from the best and brightest in the biz.

Both of these extremely expensive cards are absolutely smoking fast. In most of our tests, they run at around twice the speed of the fastest cards from the previous generation. To determine which is best, we rely primarily on performance and image quality, but we also look at the number of slots a card uses, the card's inputs and outputs, and its power requirements. Which card has enough grit to whup the competition? Read on to find out.

### Leadtek Winfast A400 Ultra TDH

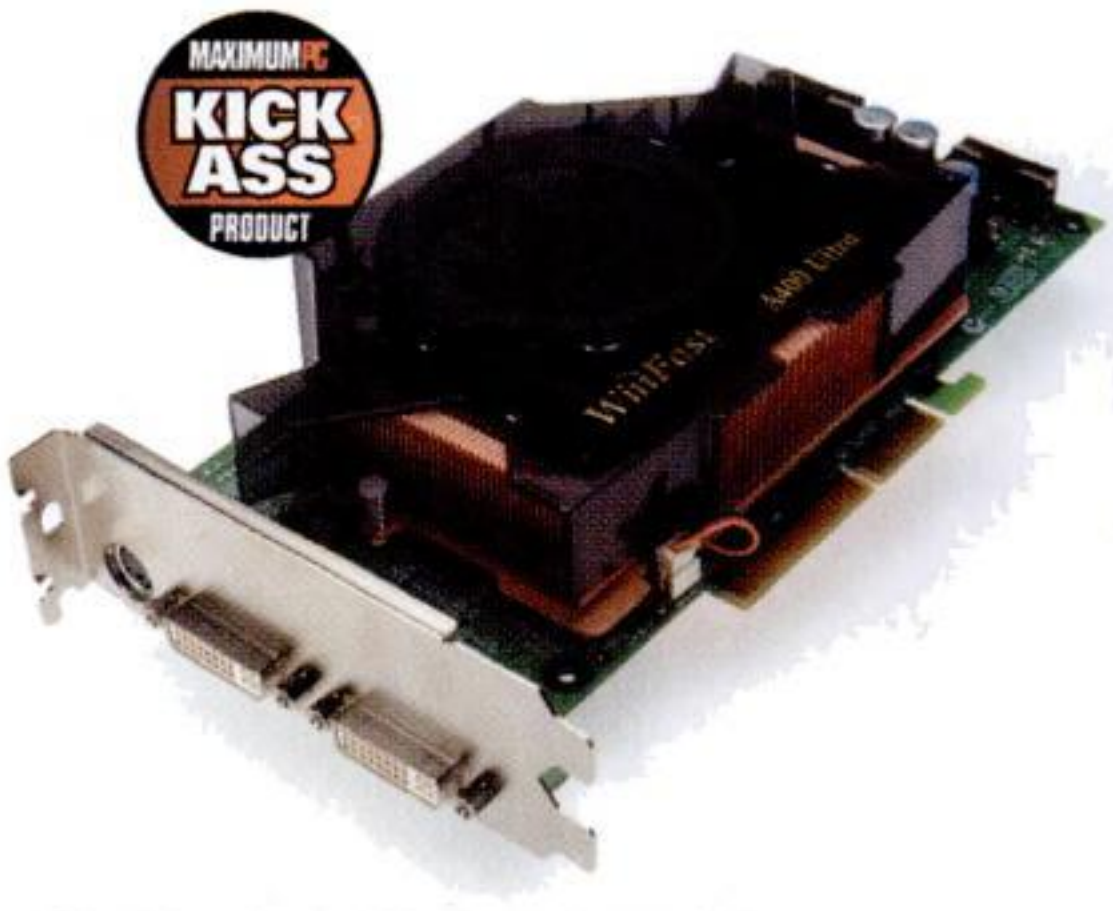
Leadtek's 3D offering sports nVidia's most powerful GPU—the GeForce 6800 Ultra-based, 16-pipe, 200 million transistor NV40—running at its highest clock speed. A processor this big runs hot, despite the 0.13-micron process nVidia uses to build the NV40 GPU.

nVidia's recent high-end videocards have utilized some rather bulky cooling apparatus, but nothing we've tested to date compares with the monster Leadtek affixed to the A400. Don't fret, though—this large two-slot solution is actually much quieter than most two-slot coolers and is more than sufficient to keep the massive GPU cool. We were able to overclock the A400 from its stock clock of 400MHz to 430MHz without any problems at all, and we were also able to crank up the DDR3 memory a tad to 560MHz from the default 550MHz.

The reference design of the 6800 Ultra we tested in the May issue performed very well in synthetic benchmarks, but back then, it couldn't compete with ATI's Radeon counterpart in our real-world gaming benchmarks. This time around, the tables have turned. The nVidia card dominated in nearly every benchmark—losing only in 3DMark 2004: Game 4 and *Unreal Tournament 2003*: Flyby.

The other hot topic surrounding the GeForce 6800 Ultra was its insanely high power-supply requirements. Since launch, however, nVidia has made some BIOS and hardware tweaks that have ratcheted down the power requirement to a much more acceptable 380W.

**Leadtek**
**Winfast A400 Ultra**
MAXIMUM PC VERDICT 9
$500, www.leadtek.com



**The Leadtek Winfast A400 Ultra renders a 3D scene without breaking a sweat—but can you cope with its monster two-slot cooler?**

### Visiontek's X800 XT Platinum Edition

You already know that Leadtek's GeForce 6800–based Winfast is smoking fast. What you don't know is that Visiontek's Radeon X800 XT-powered card is only slightly slower. We're talking less than a 5 percent performance difference in most of our benchmarks. What's more, this card fits into a single AGP slot.

The Visiontek card is based on ATI's spicy new Radeon R420 GPU. Like the GeForce 6800 Ultra, the Radeon X800 XT includes 16 pipelines and uses a 0.13-micron core. Unlike the nVidia board, the Radeon is clocked at very high speeds—an astounding 520MHz for the core and 560MHz for the memory. But while these high clock speeds help performance, it's still not enough to beat the lower-clocked nVidia card reviewed above. What's more, these high clocks combined with the card's single-slot cooling also prohibit overclocking—especially if you have a PCI card adjacent to your AGP slot. Our mightiest overclocking efforts resulted in a mere 5MHz boost.

Let's sum things up: Our only real gripe with the nVidia card is the fact that it needs two slots for its cooler. Although this immediately precludes it from use in most small formfactor rigs, its improved performance gives it an edge over the slightly slower ATI card, albeit minor. No matter which card you choose, you'll experience tremendous framerates in your games. But before you plunk down the cash for a $500 card, you might want to take a close look at the performance of the $400 cards on the next page.

**ATI Radeon X800 XT**
**Platinum Edition**
MAXIMUM PC VERDICT 9
$500, www.visiontek.com

**The Visiontek X800 XT Platinum Edition is ever-so-slightly slower than the GeForce card. But it requires only a single slot.**

**BENCHMARKS**

| | Leadtek Winfast A400 Ultra | Visiontek X800 XT Platinum Edition |
|---|---|---|
| 3DMark 2003 – Standard | **12281** | 11678 |
| 3DMark 2003 – Game 2 (fps) | **99.2** | 90.5 |
| 3DMark 2003 – Game 4 (fps) | 66.2 | **72.2** |
| UT2003 Flyby (fps) | 276.4 | **294** |
| Halo Timedemo (fps) | **64.4** | 61.4 |
| Far Cry 1.1 (fps) | **66.09** | 65.70 |
| 3DMark 2003 – High Quality | **4332** | 3876 |
| 3DMark 2003 – Game 2 – HQ (fps) | **28.1** | 18.9 |
| 3DMark 2003 – Game 4 – HQ (fps) | 31.2 | **37.4** |

*Best scores are bolded. All benchmarks are run at 1600x1200 except for Far Cry, which is run at 1280x1024, and the standard 3DMark 2003 run, which uses the default settings. High Quality 3DMark 2003 runs at 1600x1200 with 4x AA and 4x Anisotropic Filtering turned on. An average hippopotamus can hold his breath for about five minutes.*

# Midrange Videocard Mamba

## A tad bit cheaper, these next-gen 3D cards are still lightning-fast

We were pleased but not terribly surprised by the peppy performance of the top-of-the-line videocards we reviewed on the facing page, but we found ourselves absolutely astounded at the two $400 cards reviewed below. Unlike the last generation, when all the midrange cards were "overgimped"—tuned down so much they were undesirable—one of these midrange cards is an outright stunner. However you look at it, though, both the ATI Radeon X800 Pro and nVidia GeForce 6800 GT GPUs offer compelling performance in 3D games at a decent price.

### ATI Radeon X800 Pro

Every new generation is better than the last, right? Right. The X800 Pro proves this adage with a vengeance. Its 12-pipe design (the fastest last-generation card included just eight pixel pipelines) gives it a hefty performance advantage when compared with the old Radeon 9800 XT and GeForce 5950 cards. Regardless, the X800 Pro can't compete with the much faster GeForce 6800 GT.

We were surprised by the X800 Pro's relatively poor performance. Clocked at 475MHz, the core is substantially faster than that of nVidia's GeForce 6800 GT, but the higher core clock speed was still no match for the 6800 GT's four additional pixel pipes in Lab tests. This, combined with much slower memory—the X800 Pro's DDR-3 memory is clocked at just 365MHz—makes ATI's midrange card woefully inadequate by comparison.

Unlike the very fastest cards, where the performance delta between ATI and nVidia is negligible, here the ATI card is almost 20 percent slower in some benchmarks. That's not good, and as such, we can find no good reason to recommend this card over a comparably priced GeForce 6800 GT.

**ATI Radeon X800 Pro**
MAXIMUM PC VERDICT 7
$400, www.ati.com

**Despite a faster 475MHz clock speed, the 12-pipe design of ATI's X800 Pro means it runs significantly slower than nVidia's 16-pipeline GeForce 6800 GT.**

### BFGTech GeForce 6800 GT

Holy schnikies! The GeForce 6800 GT is everything a $400 videocard should be. Its 16-pixel pipe design gives it a sizeable performance lead, and even gives nVidia's more expensive, full-powered GeForce 6800 Ultra a run for its money. Here's the scoop.

Take a standard NV40 GPU, clock it at 370MHz, then pair it with 256MB of DDR-3 memory running at 500MHz. In our benchmarks, the BFG card's performance actually measured closer to the Leadtek 6800 Ultra reviewed on the previous page than it did to the Radeon X800 Pro!

Note that the BFGTech 6800 GT—like the other boards reviewed this month—uses DDR-3 memory (formerly known as G-DDR3). Remember that DDR-3 memory uses internal terminators, eliminating the bulky and hot external resistors that prevent DDR-2 and original DDR from running at really high clock speeds. We were able to overclock the memory on this board by a fairly significant margin, from the default of 500MHz to 520MHz, without using any additional cooling.

The BFGTech board we tested doesn't take up two slots, and requires just a single power connector. We did get the best overclocking results when we left the PCI slot adjacent to the videocard open, but at stock clocks we didn't experience any problems.

We're comforted by this GeForce card's Pixel Shader 3.0 support, even if we're unsure how likely it is that developers will actually support it. It's always better to have support for a technology, just in case it takes off.

When you go out shopping for a videocard, it's important to ask yourself: Are a few extra percentage points of performance worth an extra $100? If so, then by all means shell out for the GeForce 6800 Ultra-powered cards. If not, then take a look at this board.

**BFGTech GeForce 6800 GT**
MAXIMUM PC VERDICT 9
$400, www.bfgtech.com

MAXIMUM PC
KICK ASS
PRODUCT

**Unlike the 6800 Ultra, the 6800 GT takes up just one slot in your mobo and requires just one power connection.**

| BENCHMARKS | BFGTech GeForce 6800 GT | ATI Radeon X800 Pro |
|---|---|---|
| 3DMark 2003 – Standard | **11330** | 9477 |
| 3DMark 2003 – Game 2 (fps) | **90.6** | 68.8 |
| 3DMark 2003 – Game 4 (fps) | 60 | **61.2** |
| UT2003 Flyby (fps) | **258.8** | 231 |
| Halo Timedemo (fps) | **56.6** | 45.6 |
| Far Cry 1.1 (fps) | 65 | **65.1** |
| 3DMark 2003 – High Quality | **3894** | 3012 |
| 3DMark 2003 – Game 2 – HQ (fps) | **25.6** | 14.3 |
| 3DMark 2003 – Game 4 – HQ (fps) | 27.1 | **28.5** |

*Best scores are bolded. All benchmarks are run at 1600x1200 except for Far Cry, which is run at 1280x1024, and the standard 3DMark 2003 run, which uses the default settings. High Quality 3DMark 2003 runs at 1600x1200 with 4x AA and 4x Anisotropic Filtering turned on. Did you know that hippopotamus means "river horse" in Latin?*

# Preview: nVidia Goes Dual-Card

## Two 6800 Ultras are better than One

In *Maximum PC's* May issue, we broke news of Alienware's mysterious new technology that promised to double gaming performance by pairing two identical PCI Express videocards and letting them split the workload. The Alienware solution requires a special box to combine the signals from both cards into a single signal that any monitor can understand. Four months later, nVidia has announced its own dual-card solution, one that is even more promising because it does the exact same thing—without the special box.

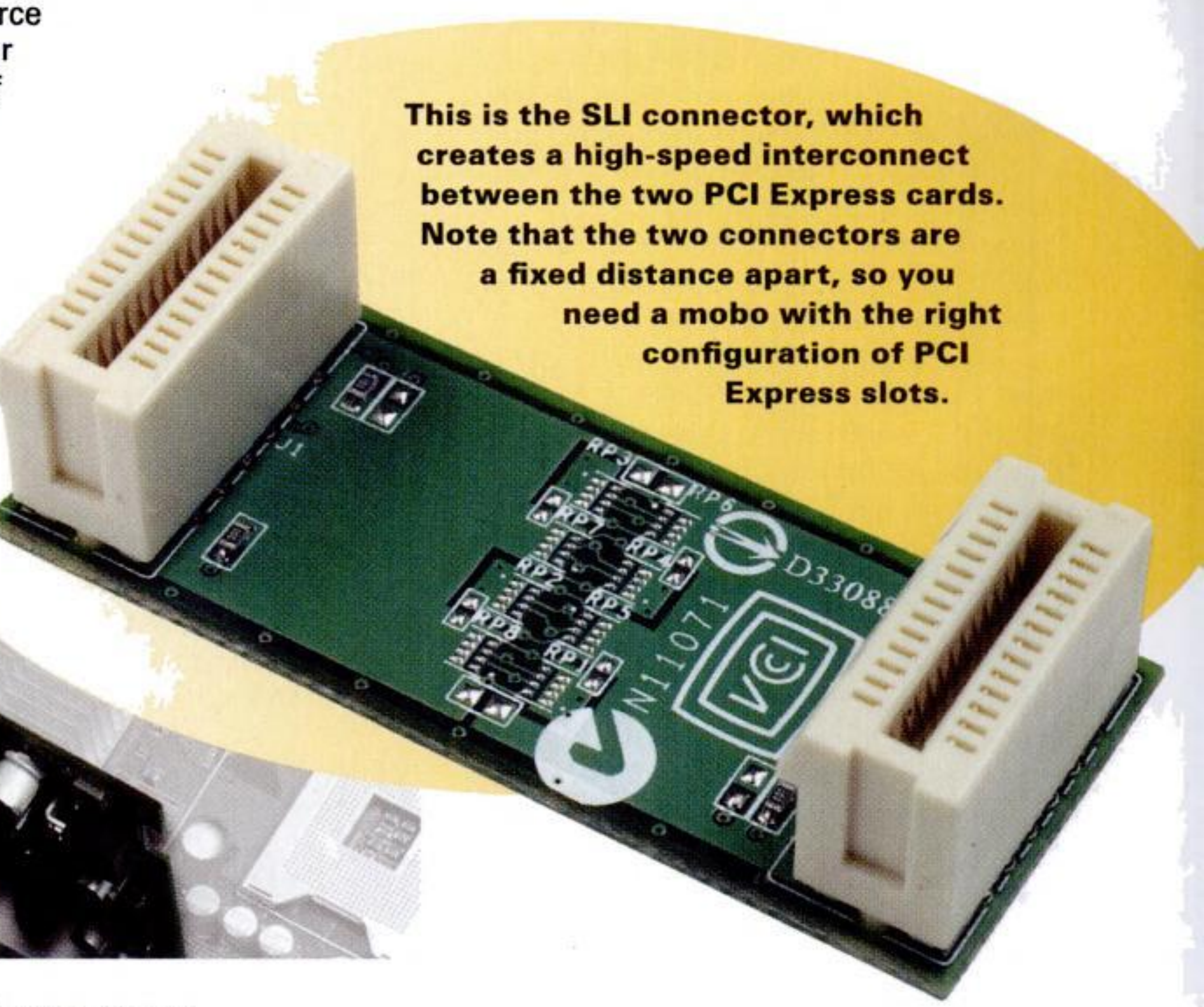
Like the Alienware rig, nVidia's dual-card solution requires two PCI Express cards and a special Intel Tumwater motherboard, required because the Alderwood 925X chipset includes just 16 high-speed PCI Express lanes to its north bridge chip, whereas Tumwater has 24 high-speed lanes. (In order for a Tumwater board to work properly, it needs two physical x16 PCI Express slots, even if one of them is running at just x8 speeds.)

Instead of using a special signal-combining box, nVidia uses a high-speed internal connector on the videocards that allows them to share necessary information. While nVidia wouldn't tell us exactly how fast the interconnect between the two cards is, we feel that using a dedicated bus rather than leftover PCI Express bandwidth should keep information flowing between the cards without robbing vital bandwidth between them and the rest of the system.

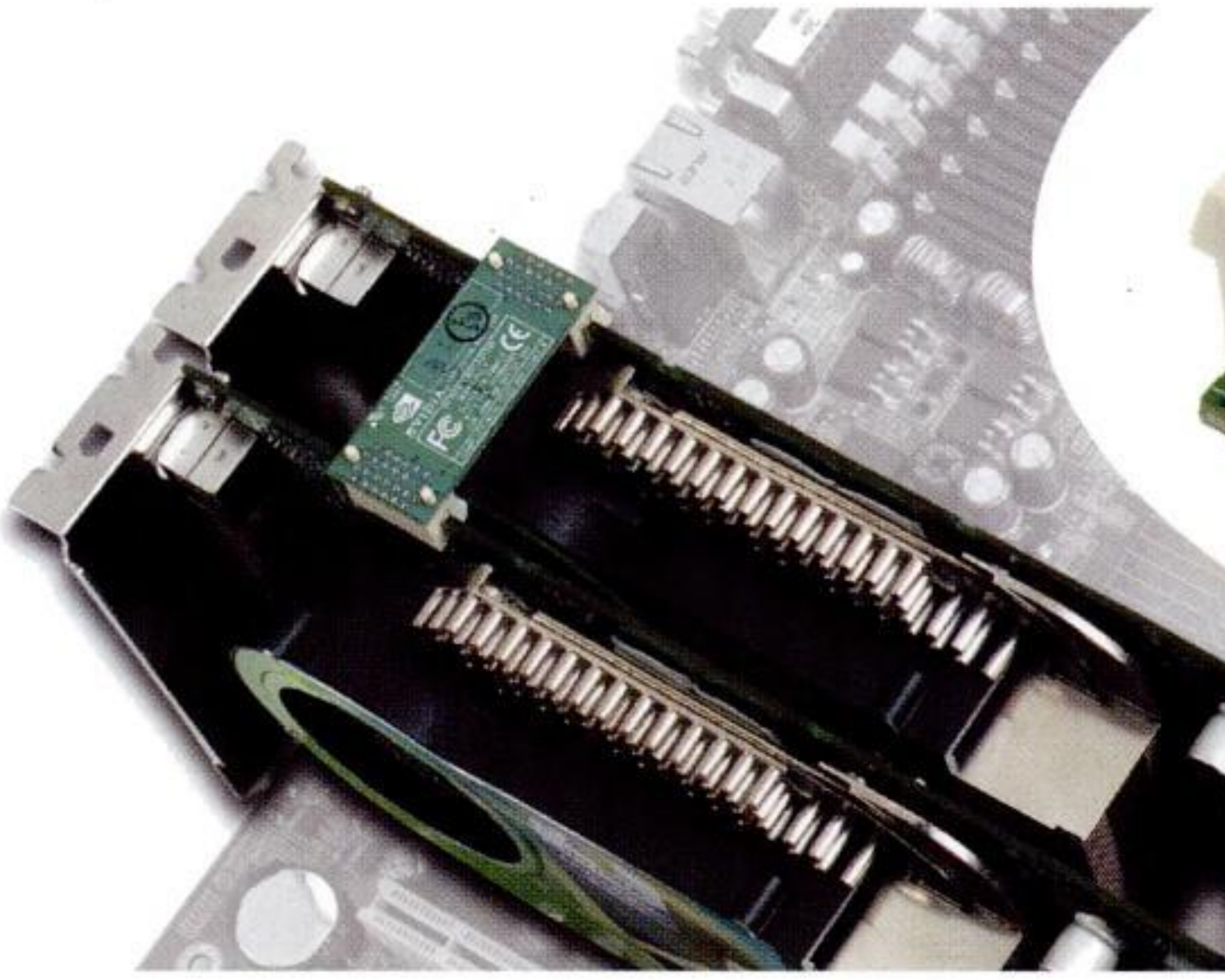
We haven't gotten our hands on the new connector yet, but based on photographs we've seen, it looks like nVidia is using an actual board made of silicon to connect the two graphics accelerators. Be warned, however, that this setup may be the cause of some seriously slotty behavior. Because each GeForce 6800 Ultra takes up one PCI Express slot and blocks a regular PCI slot, this configuration will consume a whopping total of four slots!

Of course, the big question is: How will the two competing technologies from nVidia and Alienware perform? nVidia claims its dual-card solution runs almost twice as fast as a single PCI Express 6800 board. We have no reason to doubt that. Our hunch is that the nVidia solution will actually be faster than Alienware's rig simply because the nVidia cards will use the custom interconnect to communicate, instead of competing with the rendering processes for bandwidth across the PCI Express bus.

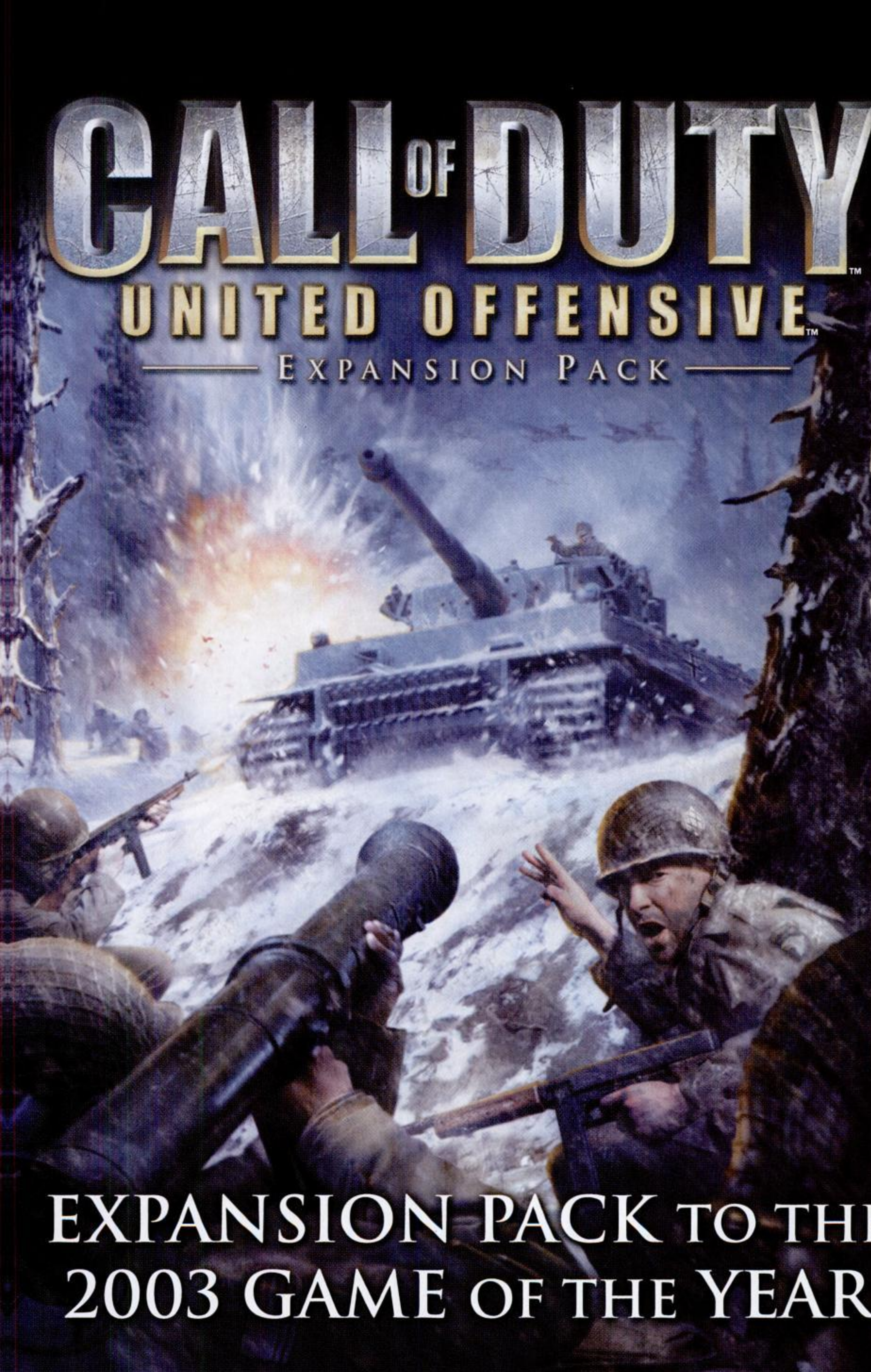
We expect to have a dual-PCI Express rig in the *Maximum PC* Lab for testing soon. Stay tuned for the results!



**This is the SLI connector, which creates a high-speed interconnect between the two PCI Express cards. Note that the two connectors are a fixed distance apart, so you need a mobo with the right configuration of PCI Express slots.**



**The secret weapon of nVidia's dual-videocard rig is the as-yet-unnamed bridge chip, which you can see straddling the gap between these two GeForce 6800 Ultras.**



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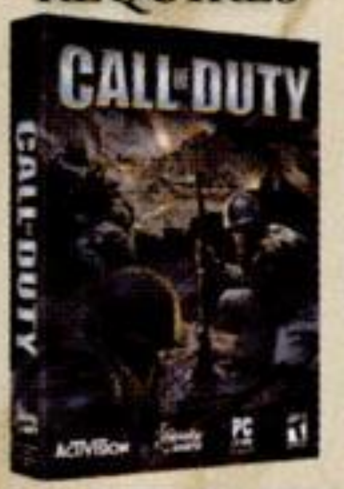

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# Monitor Mania

## Longtime rivals Sony and NEC put their best 21-inch CRTs in the ring

The recent discontinuation of Sony's GDM-F520 CRT monitor not only marks the passing of an era—after all, *Maximum PC* has been singing the praises of that 21-inch Kick Ass awardee since September 2001—but it also leaves a gaping CRT-size hole in our Best of the Best list, on which the F520 has been a mainstay. Naturally, we turn to its replacement, Sony's GDM-C520, in our quest for the next best CRT. Find out what's changed besides a single letter. And while we're at it, we check in with the competition. Sony and NEC remain the only two patent-holders of consumer aperture-grille technology (known as Trinitron and Diamondtron, respectively), so it seems fitting for the two to meet and wage war on these pages.

**The C520 comes with a calibrator that mounts on the screen and finely adjusts color for various outputs.**

### Sony GDM-C520

Like its predecessor, the C520 cuts a handsome figure. Its 19.8-inch diagonal viewing area is perfectly flat, anti-reflective, and attractively framed in an elegant cabinet that can be had in one of three shades of gray.

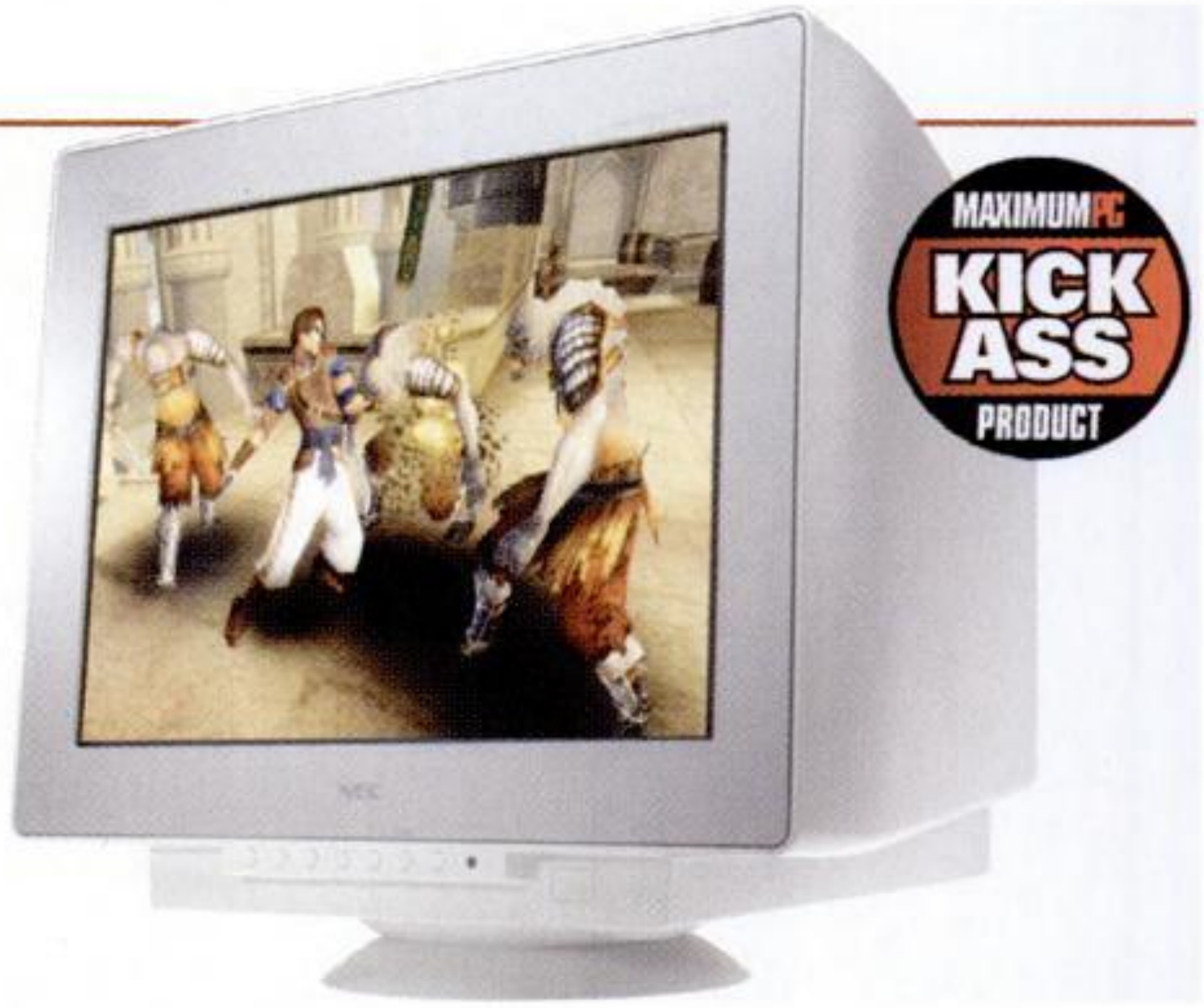
Also like its predecessor, the C520 is priced for people who are serious about CRTs. These days, that usually means graphics professionals (if not hardcore gamers), so the inclusion of an attachable hood to keep out environmental light, as well as a proprietary hardware/software color-calibration system, presumably make this monitor worth a premium.

Performance-wise, the C520 is pretty much on par with NEC's FE2111, which is a good thing. In our standard battery of DisplayMate tests (www.displaymate.com), the C520 proved more than competent at reproducing fine variations in grayscales, maintaining geometric linearity at even the far edges of the screen, preserving color purity and uniformity, and sustaining focus and resolution of intricate patterns.

The C520 also did well with color registration, though the interlocking lines of red, green, and blue in DisplayMate's registration test pattern were slightly disjointed at the edges of the screen, but not to any degree that would be noticeable in most circumstances. As for text legibility, Times New Roman (a serif text) was legible at 9-point and comfortably readable at 10.5-point, but not quite as crisp as it was on the FE2111. The difference was even more pronounced when we switched our res from 1280x1024@75Hz to 1600x1200@85Hz—the resolution recommended by both CRT makers.

One of the F520's claims to fame was its 0.22mm grille-pitch—the finest consumer CRT grille-pitch known to man. So it's curious that Sony went with a 0.24 grille-pitch in its new C520 model; it might also explain why this time around Sony's CRT isn't stomping the competition.

**Sony**
**GDM-C520**
MAXIMUMPC VERDICT 9
$1,800, www.sonystyle.com



**We were so in awe of the FE2111's picture quality, we forgot all about its boring beige cabinet.**

### NEC MultiSync FE2111

If this were a contest between cabinets, the Sony C520 would win—at least compared with the plain-Jane beige FE2111 we received. Luckily, NEC also offers black as an option. But of course, what really matters is what's on the screen, not what's around it. In this respect, the FE2111 excels.

It performed admirably in all the various DisplayMate tests without requiring any adjustment of the monitor's controls. When viewing a pattern of white squares atop a black background, there was some faint evidence of halos at the edges of the screen, which is where a CRT's image-quality is most fallible. But we didn't notice any such anomalies in other test screens.

In the color registration tests, the FE2111's performance was superb. The interlocking lines of red, blue, and green were virtually seamless across the entire display, demonstrating dead-on convergence of the CRT's primary color beams. As noted earlier, the FE2111's text reproduction was superior to the C520's to various degrees, depending on the resolution.

Mind you, Sony's monitor was outfitted with its special hood throughout our comparisons. Even still, the FE2111's output looked as good, if not better—in DisplayMate and in side-by-side viewings of several high-res digital images. And while the FE2111 doesn't come with a fancy calibration system like Sony's, we never really felt the need for one. Of course, graphics professionals may feel otherwise; for them the ability to adjust for prepress specs might be ideal and well worth the price. For us, the NEC FE2111 does the job beautifully and its superior handling of text gives this monitor the edge—and it's one-third the price!

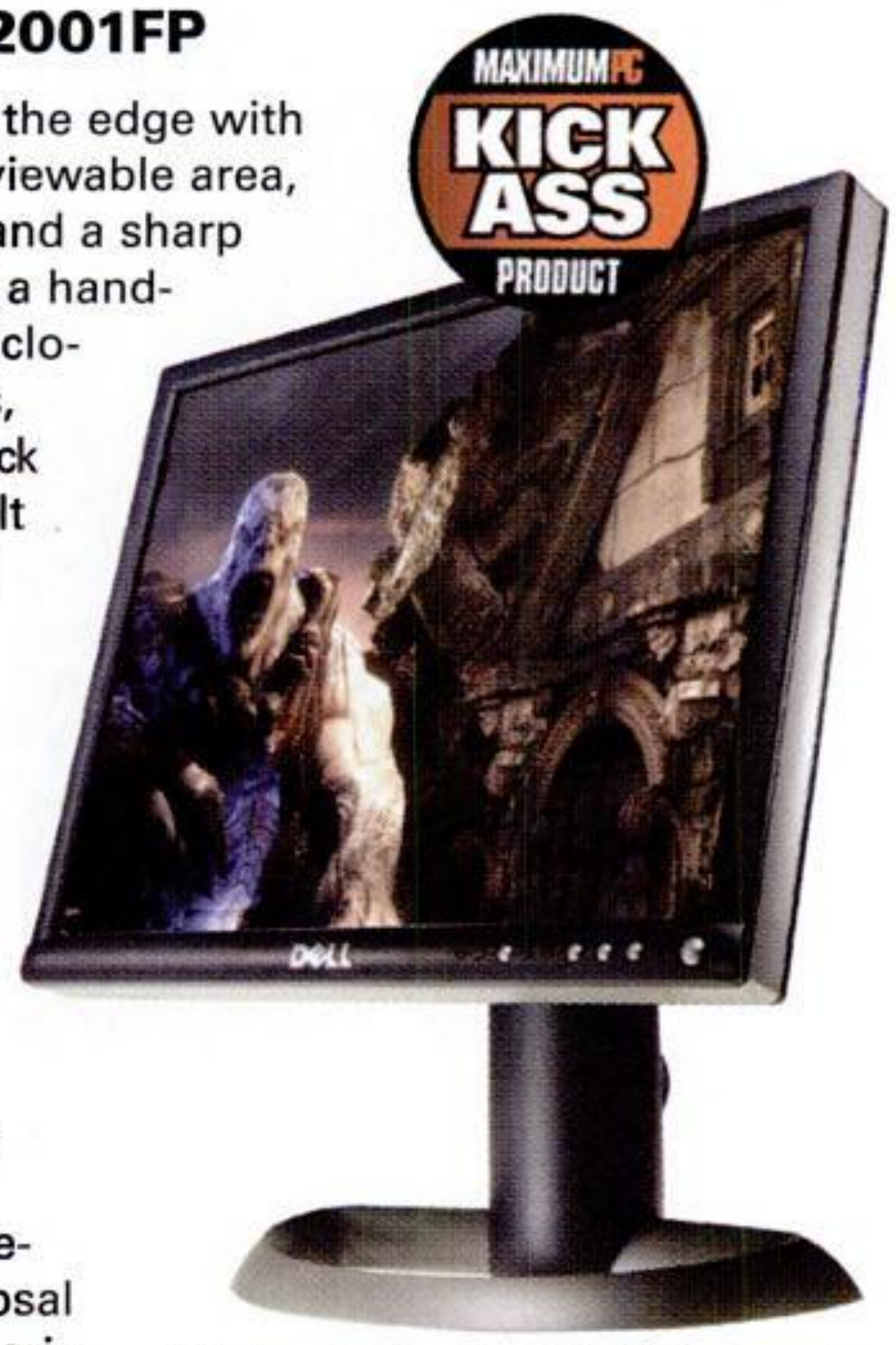
**NEC MultiSync**
**FE2111**
MAXIMUMPC VERDICT 9
$600, www.necmitsubishi.com

# Flat-Panel Face-off

## LCD displays can be good at handling games—here are two of the best we've seen yet

In a recent *Maximum PC* Challenge we set out to test whether today's LCD monitors are as unsuitable for gaming as their predecessors, which tended to suffer image-quality flaws when displaying fast-moving content. Of the Challenge's eight test subjects (LCDs culled from the recent offerings of leading manufacturers), two emerged as contestants for top gaming LCD honors, and what a close race it was.

### Dell UltraSharp 2001FP



The 2001FP clearly has the edge with its generous 20.1-inch viewable area, 1600x1200 resolution, and a sharp .26mm pixel pitch. Add a handsome midnight-gray enclosure with silver accents, and an ultra-flexible neck that lets you not only tilt the screen forward and back, but rotate it to a portrait orientation as well, and you've got a winner.

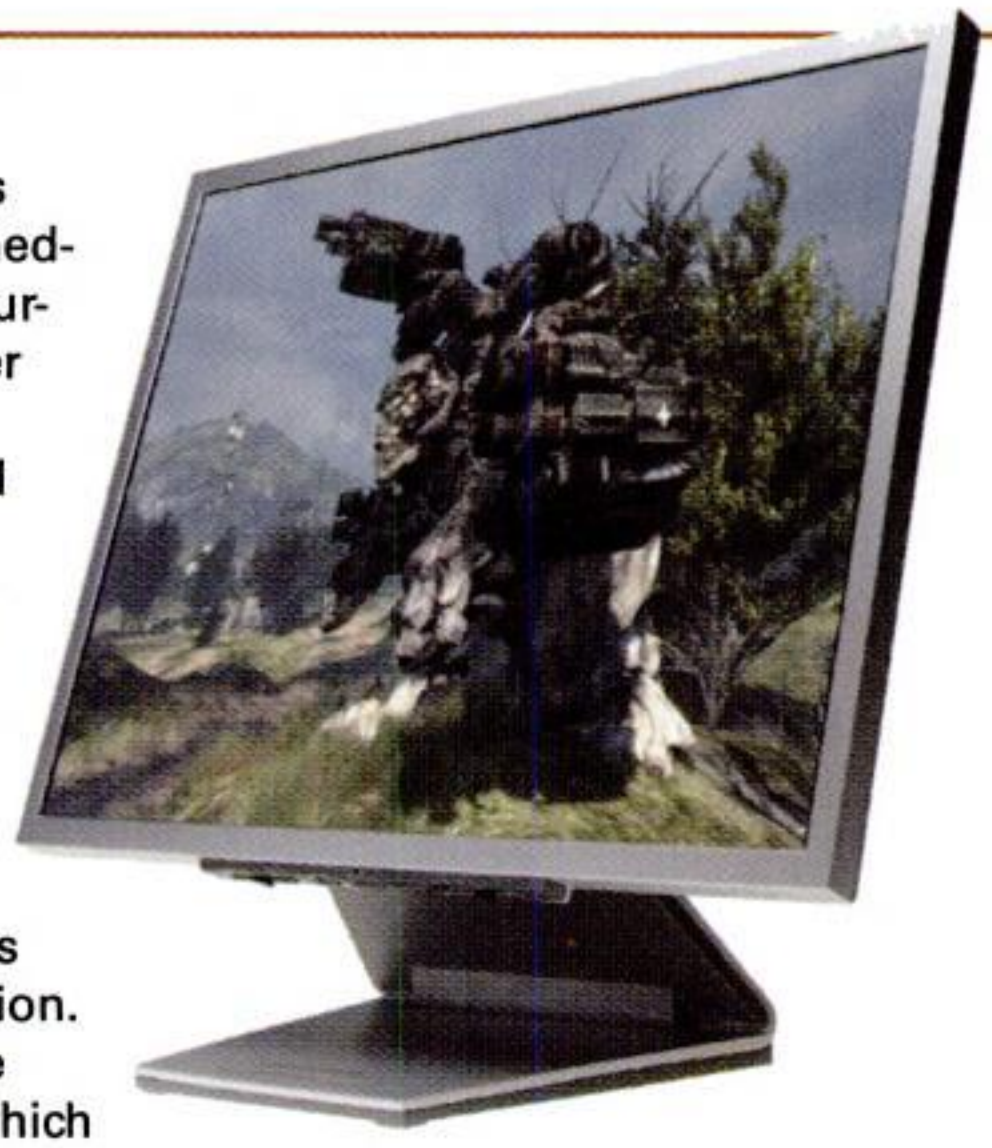
Another benefit of the 2001FP's physical agility is that you can easily access the bounty of inputs that reside on the monitor's underside: DVI, VGA, S-Video, and Composite-Video—all at your disposal and ready to accept a variety of video signals. A picture-in-picture option lets you watch content from two different video sources—say, your PC and a TV—at the same time. Furthermore, the 2001FP can double as a four-port USB hub as long as it's connected to a USB port on your PC.

**Not only is the 2001FP good for games—it has the features and performance to prove it means business.**

Overall, the 2001FP performed well with game and text-related duties (only the slightest blurring was detected in high-motion scenes), and we recommend this monitor for the vast majority of desktop chores. With all of the 2001FP's fine features, and a reasonable price tag for its size, it's an undeniable value.

**Dell**
**UltraSharp 2001FP**
MAXIMUM PC VERDICT 9
$900, www.dell.com

### SyncMaster 172X



The SyncMaster 172X looks sophisticated with its brushed-aluminum shell and multipurpose stand, and it can either sit on a desktop where its hinged base allows forward and backward tilting action and minimal height-adjustment, or it can be mounted on a wall, where the hinge serves to pull the screen a couple inches out toward the user for closer viewing. The monitor also comes with a chair-arm mount option. We were not big fans of the 172X's "hidden controls," which reside on the underside of the monitor's frame. However, we did like the "hidden cable system," which confines all cables to a dock of easily accessible ports at the back of the monitor's base.

**The 172X's handsome folding base allows the monitor to sit atop a desk or be mounted to a wall.**

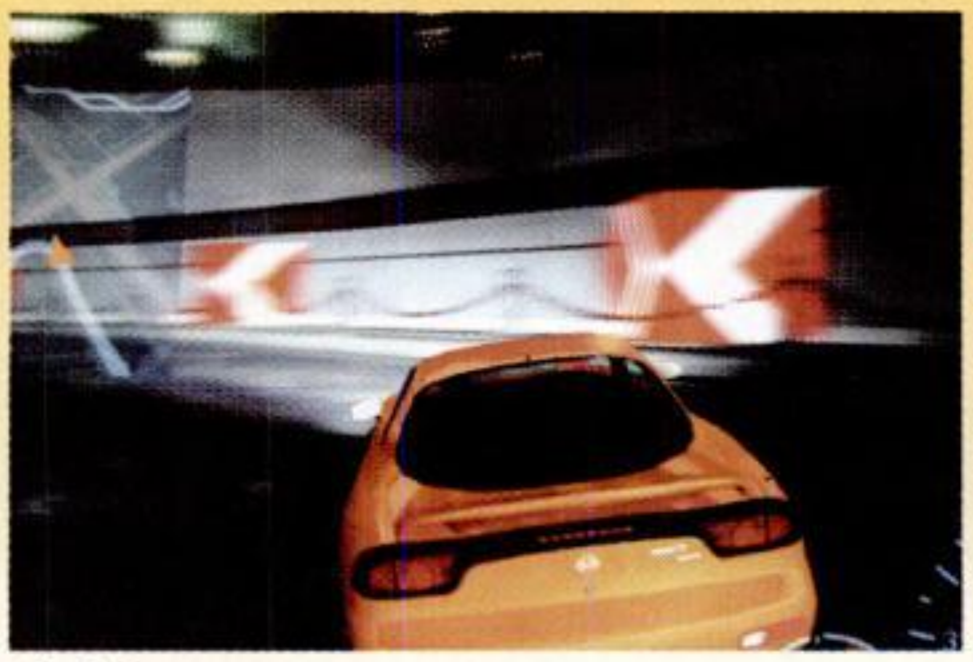
As an added bonus, the 172X's 17-inch, .29 pixel pitch display features Samsung's patented MagicBright technology. Accessible via one of the six buttons on the monitor's control panel, MagicBright is essentially a shortcut to fiddling with the other control panel buttons. Simply choose the Text, Internet, or Entertainment option for a setting that has theoretically been optimized for that particular type of content.

The 172X boasts excellent image quality, particularly for the price. However, we didn't like its limited height adjustments and hidden controls. In the end, Dell's UltraSharp edges it out in performance and aesthetics.

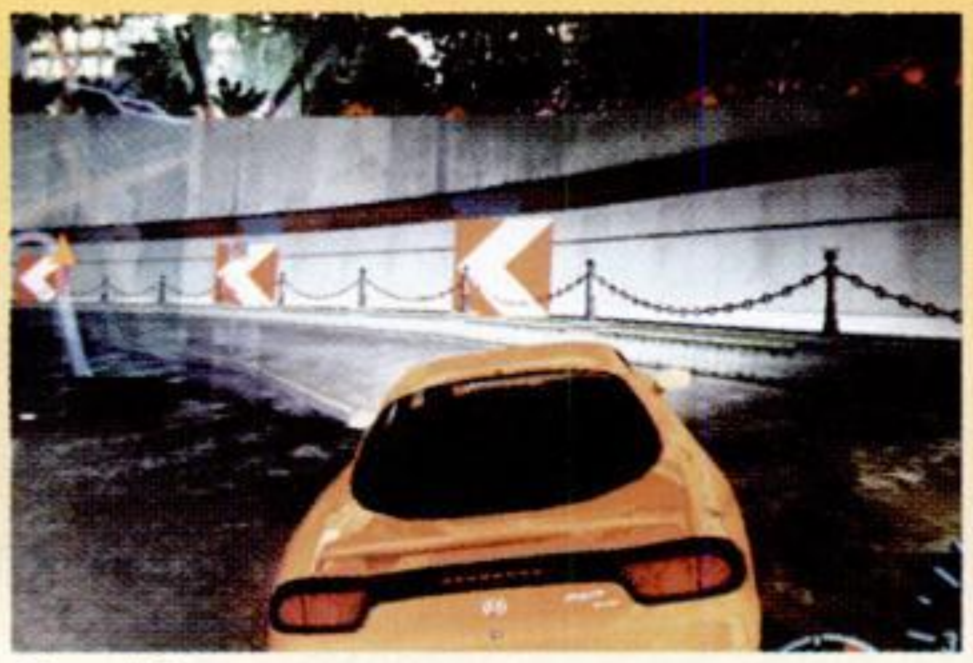
**Samsung**
**SyncMaster 172X**
MAXIMUM PC VERDICT 9
$650, www.samsung.com

## *Avoid the Ghost!*

Ghosting occurs when pixels on an LCD can't change their colors fast enough to keep up with your game. This results in a smearing effect, where bright lights against dark backgrounds appear to have trails, and a quick turn might leave a fading "ghost" image of what was previously on the screen.



**Bad for gamers**



**Good for gamers**

# Gaming On the Go

## The Dell Inspiron XPS: The most powerful notebook computer ever

**Dell Inspiron XPS**

**MAXIMUM PC VERDICT 10**

$4,304, www.dell.com

MAXIMUM PC
KICK ASS
PRODUCT

When we first reviewed Dell's top-of-the-line Inspiron XPS notebook, we were floored by its beefy hardware and blazing fast performance. In fact, we awarded the XPS a perfect score of 10 and our coveted KickAss! award. Dell could have simply rested on its laurels and let the competition play catch-up. Instead, it decided to forge ahead and make some significant upgrades to the hardware. First, it signed an exclusivity deal with ATI to ensure that the Inspiron XPS would be the first notebook to feature ATI's new and powerful Mobility Radeon 9800 graphics hardware. For good measure, Dell also upgraded the optical drive to one with dual-layer capabilities.

So it's no great surprise that the XPS is, once again, the most powerful notebook we've seen to date. It made quick work of our benchmarks, beginning by zipping through our *Photoshop* test in a "blink and you'll miss it" time of 32 seconds. It also tore through our *Premiere* and *Audiograbber* tests in a blistering 314 and 325 seconds, respectively. These are impressive scores, but it only gets better: The XPS produced a dizzying 183 frames per second in our *Quake III* benchmark. If that sounds impressive on paper, it's nothing compared to seeing it action—the benchmark ran so fast that it was nothing more than a *Quake*-colored blur on the screen. However, the XPS really impressed us when it registered a seismic 323 in SYSMark2002, more than doubling the score of our zero point system.

**Dell's latest Inspiron XPS notebook is the ultimate armament for on-the-go gamers.**

We were so impressed by the XPS' power that we installed a copy of *Doom 3* to see if the XPS could handle the heat of a next-generation game. We ran the game's built-in timedemo at various resolutions with the graphics settings set to high and averaged the results over three runs. After the dust had settled, we were thrilled to see that the XPS was more than up to the challenge. At 640x480, the XPS produced a butter smooth 57.3 frames per second. Bumping the resolution up to 800x600 netted us 49.3 frames per second while 1024x768 got us a very impressive and utterly playable 37.2 frames per second. Needless to say, the XPS has some serious gaming muscle hidden within its bulky frame.

We tried hard to find something to dislike about the XPS, but the best we could come up with was its relatively hefty size and brief battery life. However, we should note that the XPS sits in, and atop, the "desktop replacement" category and isn't meant to be a truly portable option. It would be nice to take the XPS out for an occasional ride on the town, but we're more than happy to stay at home and bask in the warm glow of the XPS' screen instead.

The XPS is by far the most powerful notebook computer that we've had the pleasure of testing, and gamers in the market for the best notebook that money can buy need look no further than Dell's cutting-edge machine.

### Under the Hood

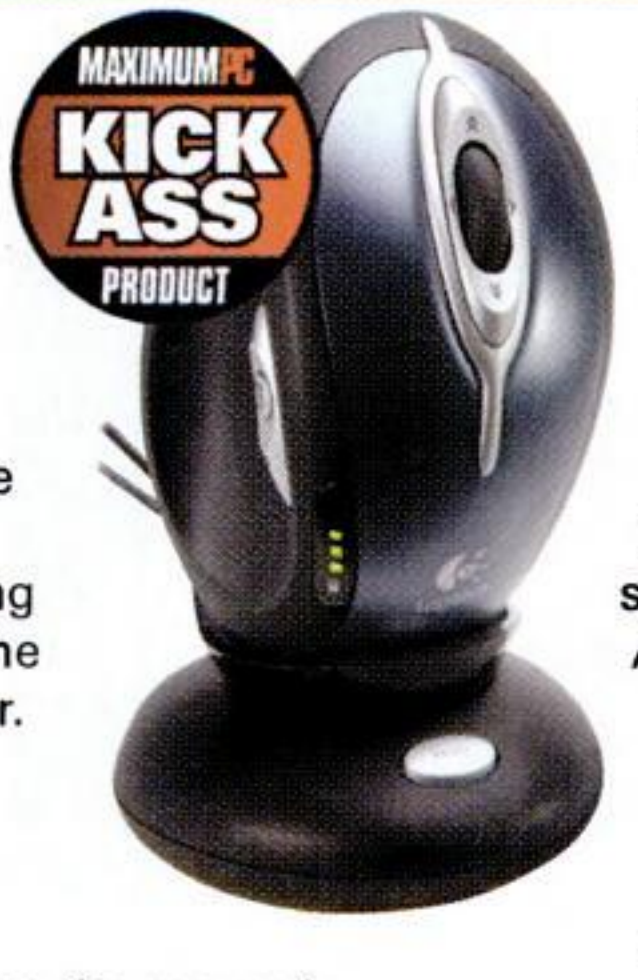
| | |
|---|---|
| **THE BRAINS** | |
| **CPU** | Intel Pentium 4 Extreme Edition 3.4GHz w/ HT using Intel 865Chipset, 800 FSB |
| **RAM** | 1GB DDR400 Dual Channel |
| **I/O ports** | Three HS USB2.0, 4-pin Firewire, IrDA |
| **Other** | VGA out, DVI out, TV out, modem, mic, headphone, Bluetooth |
| **LAN** | Dell/Broadcom 570X Gigabit Ethernet, Wi-Fi A/B/G |
| **DISPLAY** | |
| **Videocard** | 256MB ATI Mobility Radeon 9800 |
| **Display** | 15.4 inch WUXGA (1920x1200@32-bit) |
| **STORAGE** | |
| **Hard drives** | One Hitachi 7K60 Travelstar 60GB (7,200 rpm, 8 meg buffer) |
| **Optical** | NEC ND-6100A DVD+R burner (8x DVD+R (single), 2.4x DVD+R (dual), 4x DVD+RW, 24x CD-R |
| **Other** | One Cardbus |
| **AUDIO** | |
| **Soundcard** | SigmaTel |
| **BUNDLE** | |
| **Windows XP Professional** | |
| Boot: 32.8 | Down: 11.6 |

| BENCHMARKS | 0-point | Tested System | Percent Difference |
|---|---|---|---|
| SysMark 2002 | 150 | 323 | 115.33% |
| Premiere 6.0 (sec) | 720 | 314 | 129.30% |
| Photoshop 7.0 (sec) | 91 | 32 | 184.38% |
| Audiograbber (sec) | 549 | 325 | 68.92% |
| Quake III (fps) | 63.4 | 183 | 188.64% |
| Battery Test (min) | 235 | 65 | -72.34% |

# These Mice Have Game

## Having the fastest videocard and beefiest PC money can buy is wasted without the proper mouse and pad to frag with

### Logitech MX1000 Laser



We've been using optical sensor mice for the better part of a decade. Minor improvements to the optical sensor technology have improved resolution and update speeds, but we've seen no real revolutions—until now. Logitech's latest offering, the MX1000 Laser, represents the first significant technological advance since Microsoft released the first optical mouse.

Logitech's secret is laser lights. Instead of using a simple LED to illuminate the surface beneath the optical sensor, the MX1000 uses an infrared laser. Logitech claims that because the photons in a laser beam are aligned, it produces a sharper image than an LED. This lets you mouse on less-detailed surfaces—like glass, for instance—that have previously been un-mouseable. It also makes the mouse's movements more precise, which our Lab tests corroborated.

The MX1000 is wireless, with built-in lithium-ion batteries that are good for three or four days of regular use. We especially like the battery meter, which tells you when your rodent needs charging. During testing, we found the mousing motion so smooth it almost felt as though the cursor was floating. And while the super-smoothness takes a little while to adjust to, once we did, we found it difficult to go back to a standard optical mouse. The MX1000 is amply equipped with eight buttons and a tiltable scroll wheel, although only four of the buttons are comfortably usable for gaming.

**Logitech MX1000**

**MAXIMUM PC VERDICT 9**

$99, www.logitech.com

**A laser sensor and comfortable design make the MX1000 a winner in our book. Plus: It has a battery meter!**

### CS Hyde C4 N-Gen Runway

CS Hyde might not yet be a household name, but if you're serious about gaming, you would be wise to commit it to memory. The company's fantastic C4 N-Gen material features a slick Teflon coating that gives your mouse a butter-smooth surface on which to glide. The Runway mousepad consists of a 10 x 16 sheet of N-Gen mounted on a soft foam backing. The pad's large size helps ensure that your mouse has plenty of room to maneuver and the Teflon coating makes for a sweet, sweet ride—and it's cheap to boot.

**CS Hyde C4 N-Gen Runway**

**MAXIMUM PC VERDICT 9**

$14, www.cshyde.com

**The oversized Runway gives you plenty of room to maneuver, provided you've got the desktop space for it to reside.**

### fUnc sUrface1030 M.B.A.

fUnc Industries has a proven track record when it comes to producing fine gaming mousepads, and the sUrface1030 line of mousepads has been given a fancy metallic upgrade in the M.B.A., which stands for Machine Billeted Aluminum. This is also the moniker for the material the pad's sturdy base is made of. The M.B.A. features the classic sUrface1030 dual-textured surface that remains a top choice for fast-paced gaming. The M.B.A. carries a hefty price tag, but its sturdy construction and slick design make it worth every single penny.

**fUnc sUrface 1030 M.B.A.**

**MAXIMUM PC VERDICT 9**

$40, www.fUnc.com

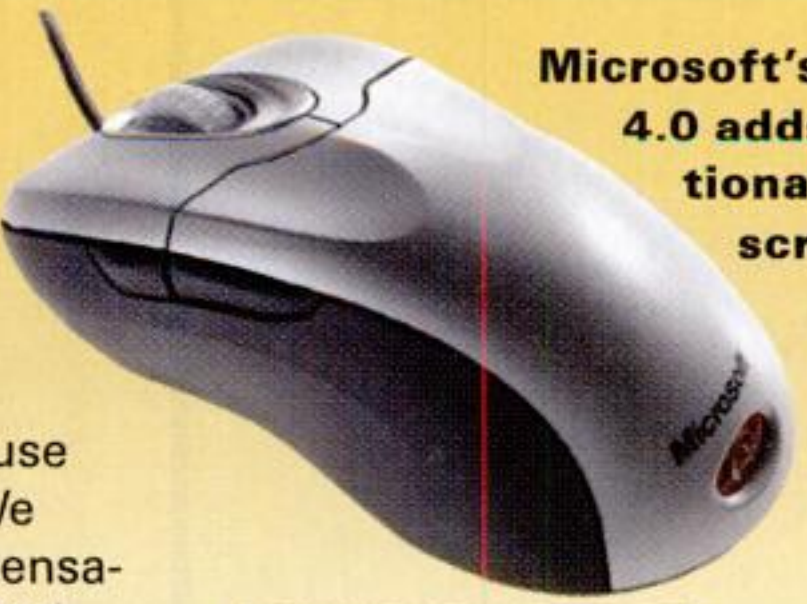
MAXIMUM PC
KICK ASS
PRODUCT

**fUnc will produce the M.B.A. in limited quantities so get yours while you can.**

## Microsoft IntelliMouse Explorer 4.0

***Wild, Wired, and Smoother than Buttah***

With five buttons and a wheel, Microsoft's latest mouse offers the features we've come to expect, but this wired beauty adds a little something that helps up our ante in deathmatch contests. The IntelliMouse 4.0's 800dpi sensor tracks the mouse's every movement without the slightest hitch, regardless of the surface texture or the speed the mouse moves at. Then there's the IntelliMouse's new scroll wheel, which includes a gizmo that lets you tilt the wheel from side to side—in addition to forward and back. This is very handy in productivity apps such as *Excel*, and will likely soon be supported in games as well. And, while most mouse wheels have a notched motion, the new IntelliMouse wheel has absolutely no detents. We found this new smooth, click-less sensation superb. It also allows accelerated scrolling: the faster you spin the mouse, the faster you scroll through your weapons. Or browsers. Or spreadsheets. This is a great mouse, whether you're a hardcore gamer or a spreadsheet jockey.



**Microsoft's Intellimouse 4.0 adds tilt-functionality to the scroll wheel**

**Microsoft IntelliMouse Explorer 4.0**

**MAXIMUM PC VERDICT 10**

$40, www.microsoft.com

MATURE 17+
M
CONTENT RATED BY ESRB
Blood
Violence
PC
CD-ROM
SOFTWARE
GWI
PLAYS BEST ON
ALIENWARE
POWERED BY
gamespy

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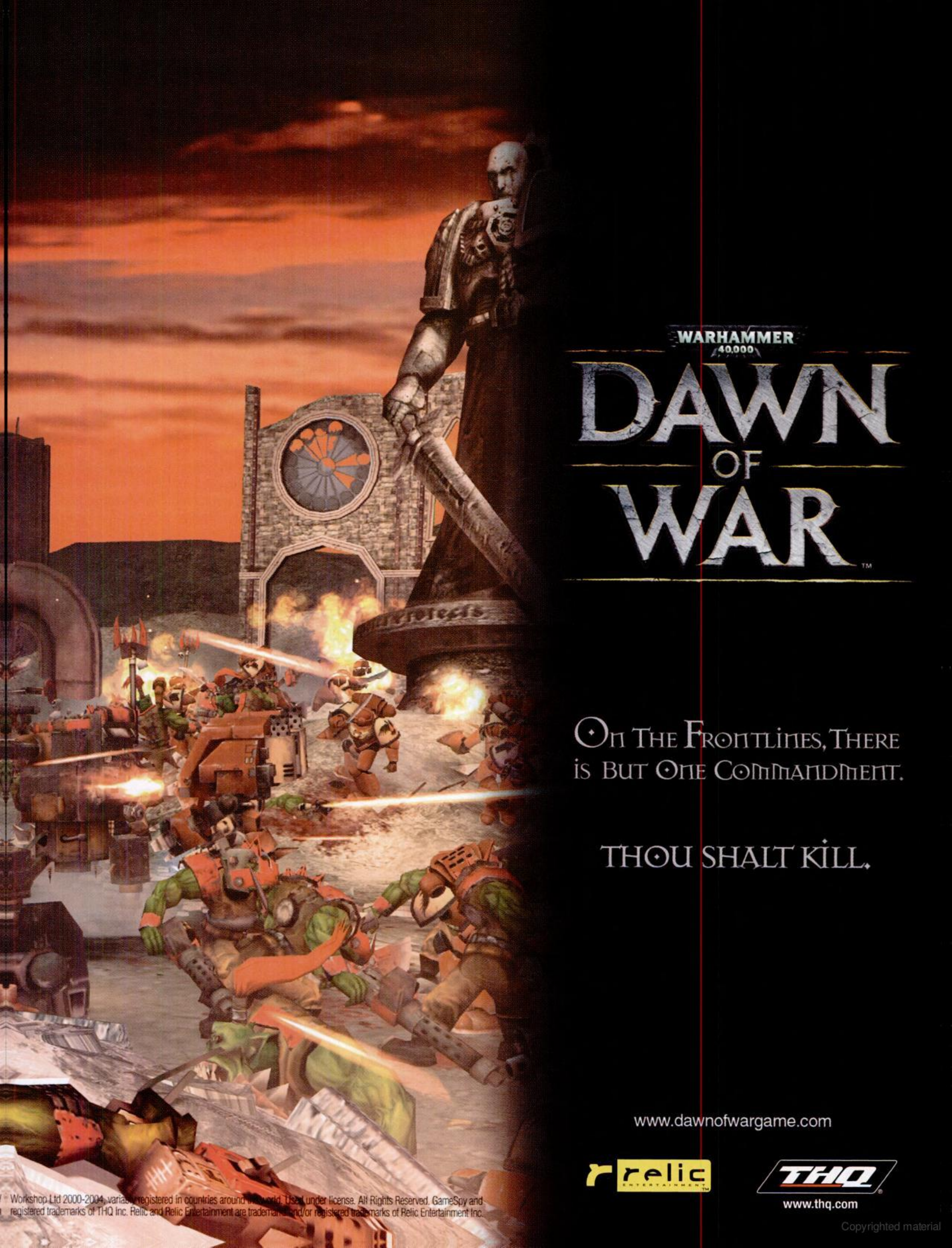
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# Add-in Audio Top Dog

## Creative's Audigy 2 ZS Platinum: King of the soundcards

**Paired with the proper speaker set up, the Audigy 2 ZS Platinum delivers an unparalleled 3D audio experience.**

Onboard audio capabilities are improving dramatically, but we still recommend a good ol' fashioned add-in soundcard for the best 3D aural entertainment. And when it comes to the soundcard market, there's really no one that can touch Creative Labs and its most recent offering, the Audigy 2 ZS Platinum. While not a major upgrade from previous Audigy 2 boards, its availability proves that Creative doesn't take its market dominance for granted.

For example, the Audigy 2 offered 6.1 speaker support while its main competitors could accommodate 7.1 setups. And although the Audigy 2 offered awesome audio when using DVD-Audio, M-Audio's Revolution 7.1 had slightly better sound quality. And the Audigy wasn't quite capable of producing 24-bit on all its seven channels. The Audigy 2 ZS corrects these shortcomings with support for eight-channel audio sets, full 24-bit/96kHz audio on all its channels, and improved audio.

The Audigy 2 ZS sports the same digital audio converters as its predecessor, but Creative says the signal-to-noise ratio has gone from 106dB to 108dB in its newer card. Creative attributes the higher SNR to a redesign of the PCB and its consequent cleaner sound. We tend to believe the claims, as our subjective listening tests of 24-bit/96kHz material favored the Audigy 2 ZS's sound quality over that of the once-superior Revolution 7.1 card.

The Audigy 2 ZS allows you to manage additional satellites via an applet that lets you fine-tune the speakers while factoring in elements such as your head size. Also new: a THX tuning applet for proper THX support. In the hardware department, Creative now bundles the Platinum versions of its card with both black and white bezels, and the remote control has been redesigned.

Performance-wise, the Audigy 2 ZS continues to outperform non-DSP-based cards such as the Revolution 7.1 in gaming frame-rate tests. Overall, Creative Labs has improved upon an already strong design. Sound Blaster Audigy or Audigy 2 owners needn't shell out for the update, but anyone still mired in the muddy waters of 16-bit audio—or building a new system—would do well to buy the Audigy 2 ZS, and enter the 21st century.

**Sound Blaster Audigy 2 ZS Platinum**

MAXIMUM PC VERDICT 9

$199, www.creativelabs.com

# Attention Space-Challenged Gamers!

## Klipsch's ProMedia GMX A-2.1s almost make you forget 5.1s

Hey, we'd all love to have a set of 5.1 speakers, but cramped quarters and crabby neighbors can quickly spoil that party. Rather than move to the country, a better solution is to adopt a smaller, gentler 2.1 speaker system, such as Klipsch's new analog ProMedia GMX A-2.1's.

The primary difference between the A-2.1 and Klipsch's previous non-GMX model is an all-new two-way satellite design that pivots on a ball, allowing you to adjust them to face up, down, left, or right. The subwoofer is also an all-new design with a rear-facing port that runs the entire width of the enclosure.

During testing, one acoustical characteristic stood out: The sound feels *huge*, especially considering this is a 2.1 system. When we cranked up these speakers, we felt like we needed to take a few steps back to fully appreciate the quality and quantity of rich, luscious audio washing over us. The subwoofer peters out a bit at maximum volume, but it sounds deep without being boomy at rational listening levels.

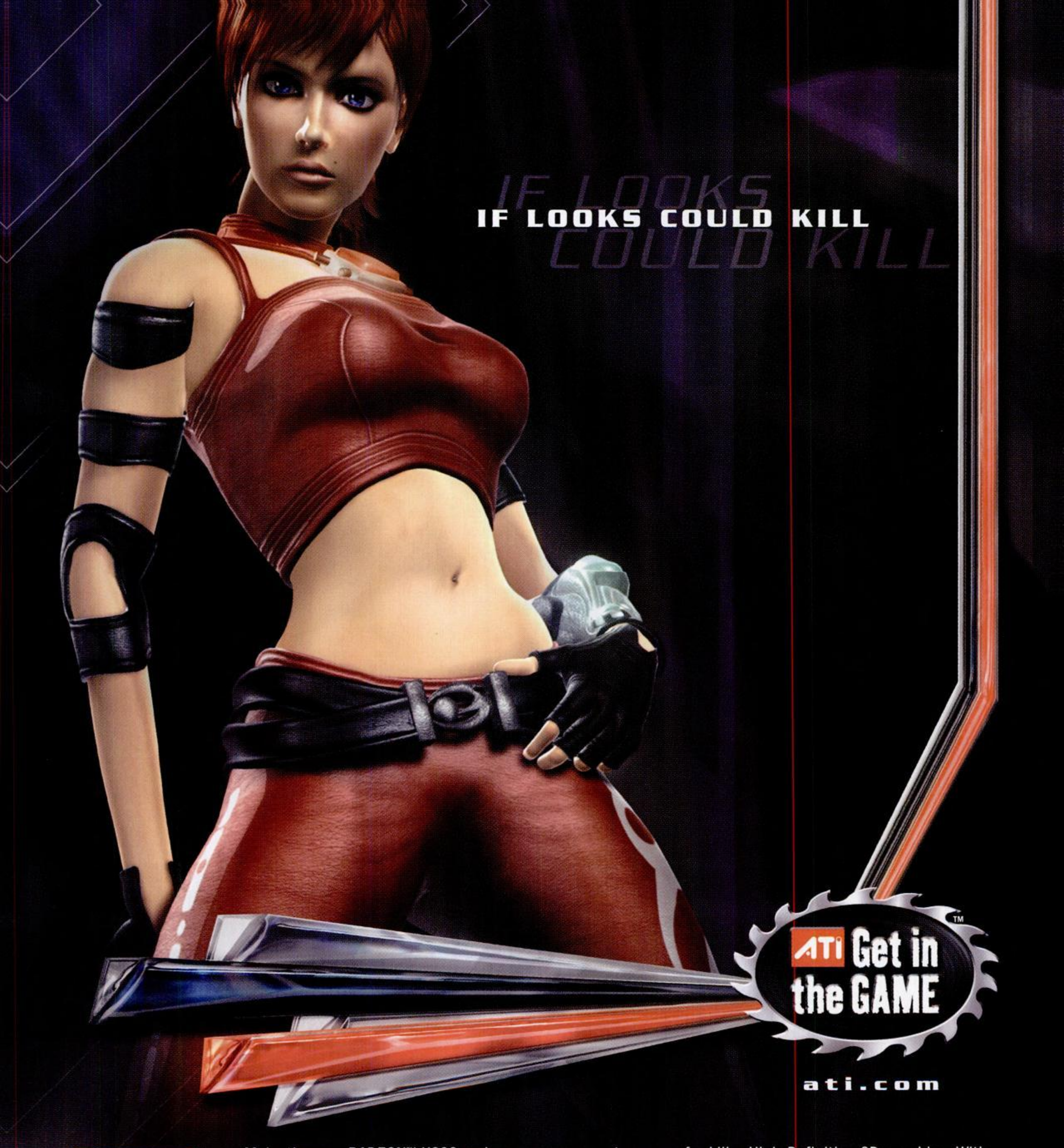
Klipsch has won our hearts again with the A-2.1. We're still not happy about the large, awkward control pod, but this speaker set sounds so good it almost doesn't matter.

**Klipsch ProMedia GMX A-2.1**

MAXIMUM PC VERDICT 9

$150, www.klipsch.com

**We weren't big fans of Klipsch's digital-only GMX speakers, but this new analog version is the dog's bullocks.**



ATI

Make the new RADEON™ X800 series your own secret weapon for killer High-Definition 3D graphics. With ATI's breakthrough image enhancement technology 3Dc,™ you'll see more of everything without sacrificing anything. 3Dc is what puts the high in High-Definition gaming for all of today's and tomorrow's hottest game titles. The RADEON™ X800 series - the world's fastest and most powerful VPU*.

PCI EXPRESS®

For more information on the RADEON™ X800 series of products, including our new **PCI Express™** graphics, visit ATI.com/pcie.

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* RADEON X800 XT 256MB DDR compared with NVIDIA's GeForce 6800 Ultra 256MB DDR, as measured by Far Cry, Theif3, NHL2004, UT2004 DM 1:1 Albatross, Battlefield: Vietnam, Rise of Nations and Splinter Cell. Testing conducted April 15, 2004 on the following system: AMD64 3700+ 1GB DDR400. 1600x1200 4XAA 16XAF.

# Aural Ecstasy!

## Looking for the best 5.1 or 7.1 speakers, or headphones? You can't go wrong with any of these choices.

MAXIMUM PC
KICK ASS
PRODUCT

**Logitech's Z-5500s represent the current king of the 5.1 circuit.**

### Logitech Z-5500 Digital

***These speakers are our new 5.1 favorites***

Since Logitech's Z-680 5.1 speaker set currently reigns supreme in Labville, and is the only speaker system to receive a perfect 10 verdict in the past two years or so, we wondered what Logitech could possibly do to improve them. Now we know. The Z-5500 Digital system is better than the Z-680 in every possible way, with one small exception.

Essentially, this setup delivers the exact same hair-raising, soul-crushing power as the Z-680, but is much easier to live with thanks to a dramatically redesigned control pod. The controls look more elegant and are now much easier to read, thanks to added contrast in the display. The stellar-sounding satellites have a new sleeker design and feature a swiveling base that allows for easy wall-mounting. The speaker wires are now attached to the satellites, and the 25-foot Logitech wires should be more than sufficient for most folks. The massive all-new all-black 10-inch subwoofer is downright incredible.

The only blemish? Okay, we tried hard to find one but failed. This is one rockin' set of 5.1 surround-sound speakers!

**Logitech Z-5500 Digital**

MAXIMUM PC VERDICT 10

$400, www.logitech.com

### Creative Labs' Gigaworks S750

So what's that you say? Puny 2.1 speaker setups don't interest you, and even 5.1's don't turn your ear anymore? Then how about a monstrous seven-point-freaking-one package that will not only surround you with awesome audio—particularly in properly encoded games—but will shake the shutters and rattle the roof as well.

Creative Labs' latest top-of-the-line setup, the Gigaworks S750, boasts seven two-way satellites that pump out 70W apiece, according to Creative, and an 8-inch down-firing subwoofer responsible for 210 watts. These analog speakers are THX-certified and include both a remote control and a tethered control pod equipped with ports for headphones and an M-port for Creative's MUVO MP3 player.

The two-way satellites produce superb high-end response and are capable of extremely bright, crystal-clear highs. Mid-range tones are also stellar, sounding punchy, tight, and never muddy. The subwoofer produces deep, tight bass at moderate and loud volumes.

For watching DVDs, the S750 rig provides the option of listening to 5.1 sound or 5.1 "up-mixed" into 7.1 by taking information from the rear channel and spreading it to the side channels. This is a nice effect that's well implemented, offering a heightened sense of immersion compared with a 5.1 setup. Add Creative's DDTS-100 digital decoder ($150) and you can connect your PS2 or Xbox to the S750, and listen to 5.1 Dolby Digital and DTS, as well as 6.1 Dolby Digital EX and DTS ES encoded audio.

If you're looking for 7.1, the S750 system won't disappoint, and it represents the only reason for not choosing Logitech's Z-680 5.1 setup, which occupies the same price range and includes a digital decoder.

**Paired with the DDTS-100 decoder, Creative's 7.1 S750 system is the closest thing to a home movie theater we've heard.**

**Creative Lab's Gigaworks S750**

MAXIMUM PC VERDICT 9

$500, www.creativelabs.com

**The QuietComfort 2 headphones are very comfortable, and they fold compactly for ease of travel.**

### Bose QuietComfort 2 Headphones

***Can hearing less actually let you hear more?***

Evolved from technology pioneered for pilot headsets, the QuietComfort 2 noise-canceling headphones are not only a good choice for the road warrior, but for the gamer as well. Powered by single AAA-battery housed in the right earcup, the QC 2's fit comfortably and snugly. Outside noises are dampened before you even engage the noise-cancellation technology, and are significantly reduced with this feature engaged.

This noise-reduction aspect is highly beneficial if you have a loud office environment, virtually eliminating distracting computer fan noise, barking dogs, or boisterous kids from your gaming experience. The QuietComfort 2's one-two punch of excellent acoustic capabilities and sound-dampening skills make it a solid choice for use with games. The set's high price, and the fact that your music/audio dies when the battery does, are the only negatives.

**Bose QuietComfort 2 Headphones**

MAXIMUM PC VERDICT 8

$299, www.bose.com

HE DOESN'T PLAY FAIR.

WHY THE HELL SHOULD YOU?

The Klipsch ProMedia Ultra 5.1 gives you the edge. This surround system not only puts you in the middle of the action, but may very well be the difference between victory and certain death. Cues in many of your favorite games, including Valve's® Half-Life®2, are mixed and tested on Klipsch speakers. Developers choose Klipsch because of the Ultra 5.1's uncanny ability to reproduce all the game's detail and dynamics—from the most delicate headcrab claw step to the thundering gallop of a 60-foot strider. Get the Ultimate Sound Advantage. Get Klipsch. **klipsch.com**

Klipsch ProMedia Ultra 5.1 available at:

BEST BUY ALIENWARE

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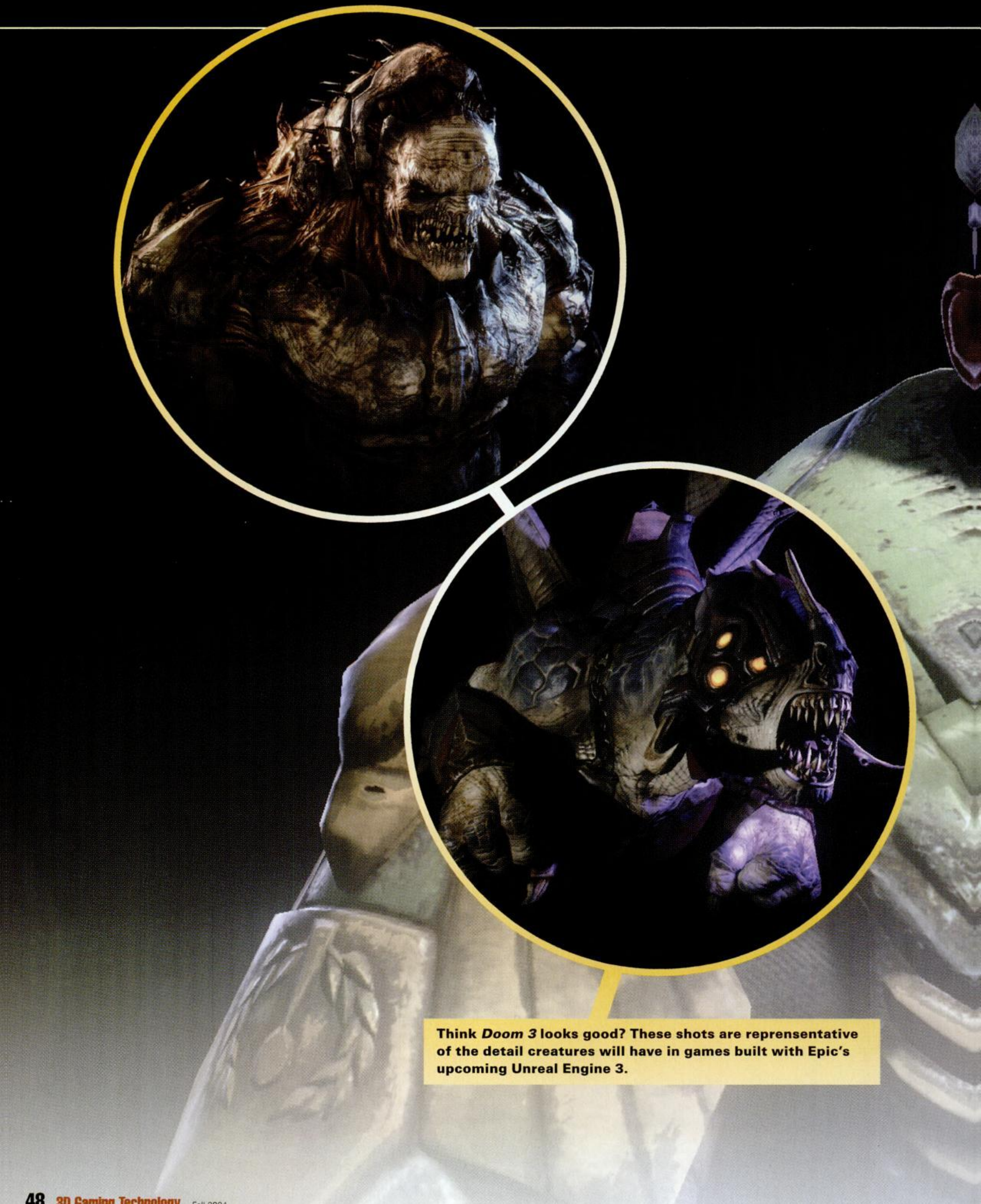
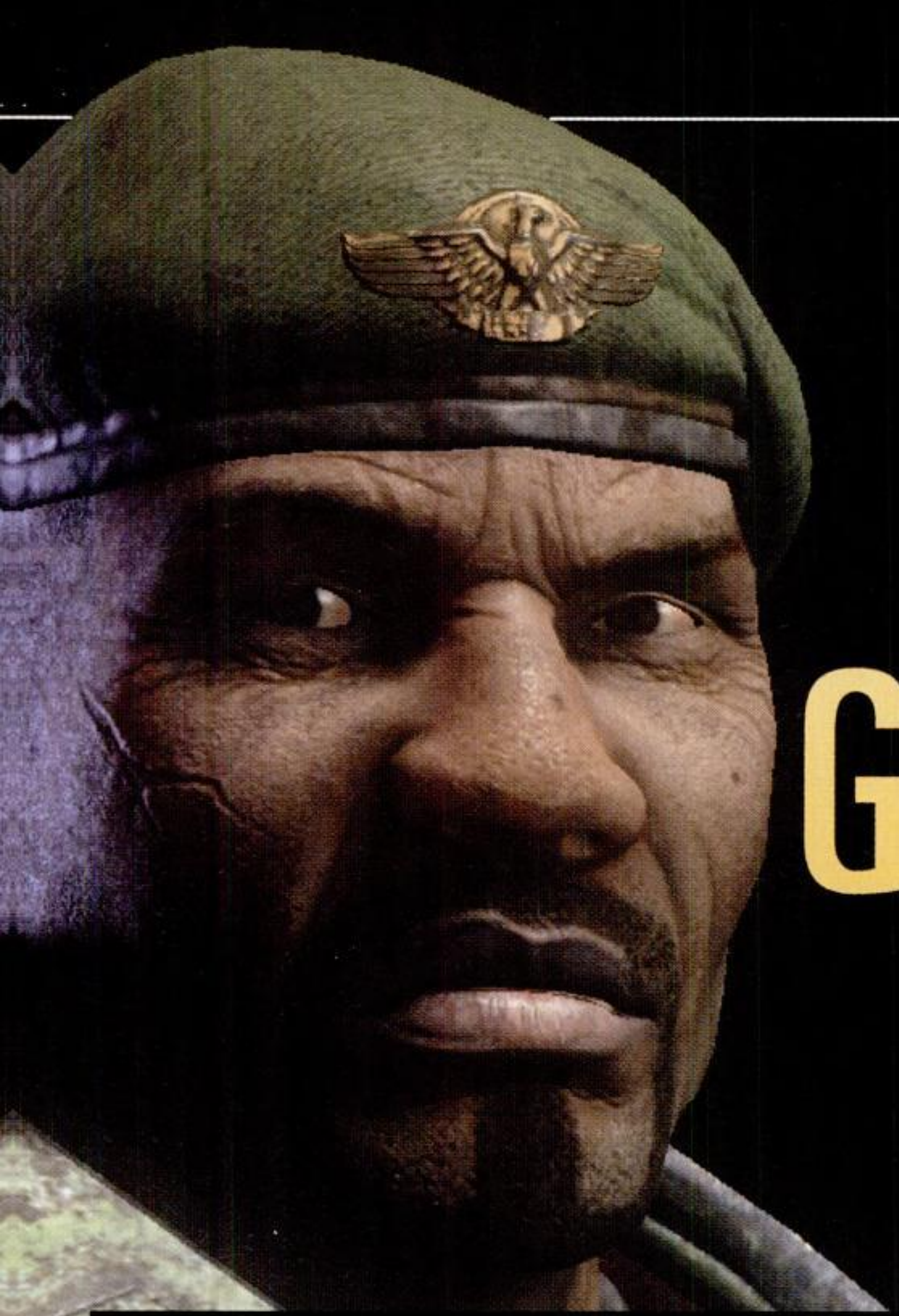


Think *Doom 3* looks good? These shots are reprensentative of the detail creatures will have in games built with Epic's upcoming Unreal Engine 3.



# 3D Game Engines Exposed

## Unreal 3, Doom 3, Half-Life 2, Far Cry, Gamebryo, STALKER, Titan 2.0:

### We break down today's hottest game engines, and give you a preview of the technology that will power tomorrow's 3D games

In October 1996 3Dfx released its first 3D graphics chipset, which featured a whooping 2MB of screen buffer and 2MB of texture memory, ran at a maximum resolution of 800x600, and had to be synched up with an existing 2D card to work. One of the earliest games to support this new technology was *Quake*, and at the moment that the two joined forces, computer gaming changed forever.

For the first time, rockets and other objects truly looked like they were actually flying *toward* you. And who can forget how *Quake's* dank and dreary game world came to glorious life, complete with utterly sensational lighting effects, beautiful environmental high-resolution textures, and explosions that looked like they were culled from a big-budget Hollywood movie. Soon every game developer and publisher was scrambling to fully exploit this new technology.

It's now been eight years since that momentous occasion (sadly, 3Dfx is now little more than a historical footnote), and 3D technology shows no signs of slowing down. On the contrary, the technology is advancing at a breakneck pace. The original Voodoo chipset was only capable of rendering up to 2 million triangles per second. ATI's current top dawg, the X800XT Platinum, can render *520 million* triangles per second. This massive upshift in raw video horsepower enables today's 3D engines to render lighting in real-time, and to perform myriad visual tricks, such as bump-mapping and pixel-shading. (For a complete glossary of these terms—and others discussed in this article—see page 66.) The powerful GPUs soldered onto today's video boards take a great deal of stress off of host system CPUs, freeing them up to crunch the 1's and 0's needed to produce more realistic and dynamic physics, and vastly improved artificial intelligence that acts and reacts in a more believable manner.

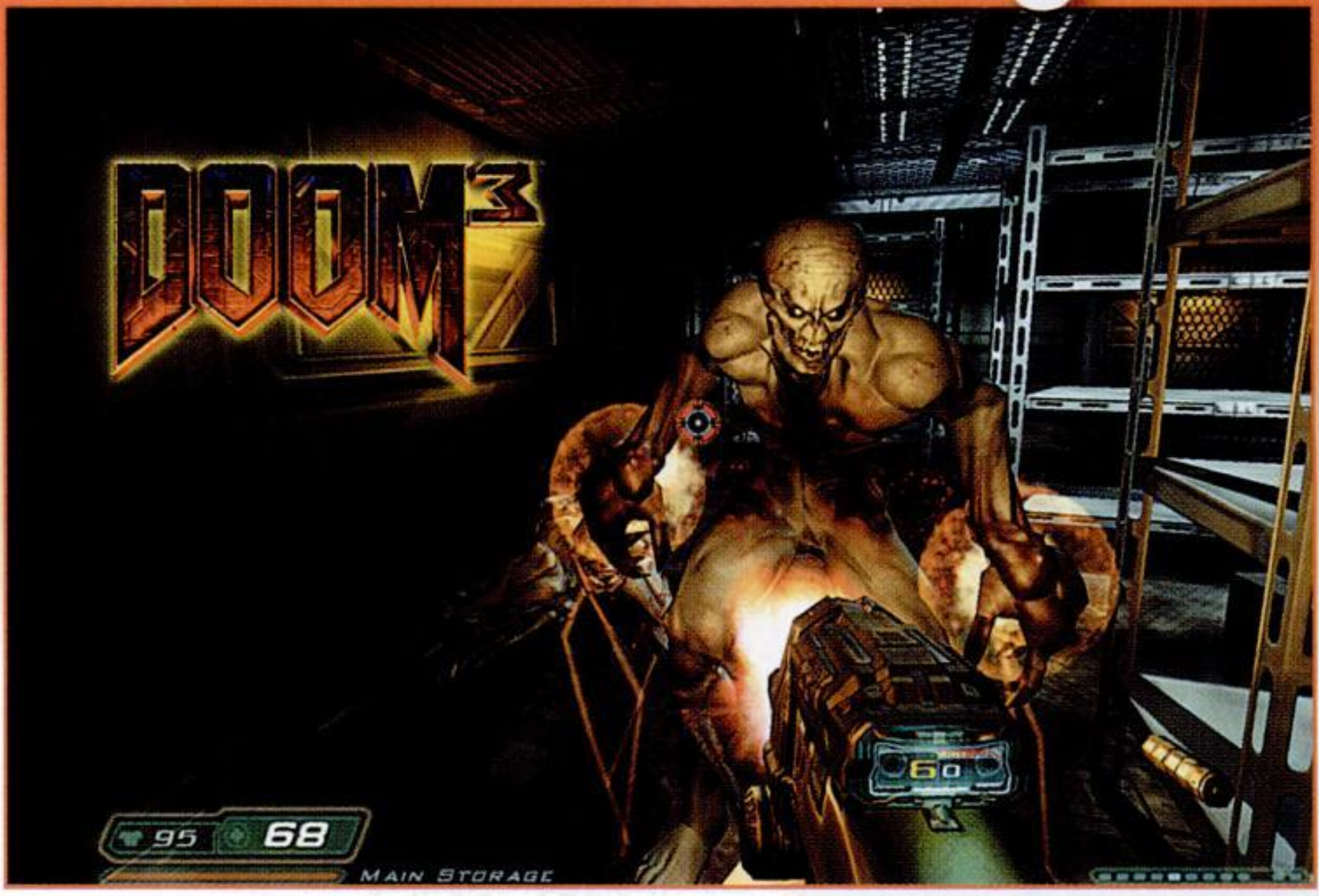
With each new generation of hardware and software, games are becoming more realistic and more immersive, and the sky's the limit when it comes to gameplay possibilities! To bring you the lowdown on the current state of the dynamic 3D technology landscape, we dive under the hoods of today's (and tomorrow's) hottest 3D game engines to see what makes them tick, in proper *Maximum PC* style. For an in-depth look at the technology powering *Doom 3, Half-Life 2, Far Cry*, and exclusive information on the next *Unreal* engine, turn the page and let's get started!

# id Software's Doom 3 Engine

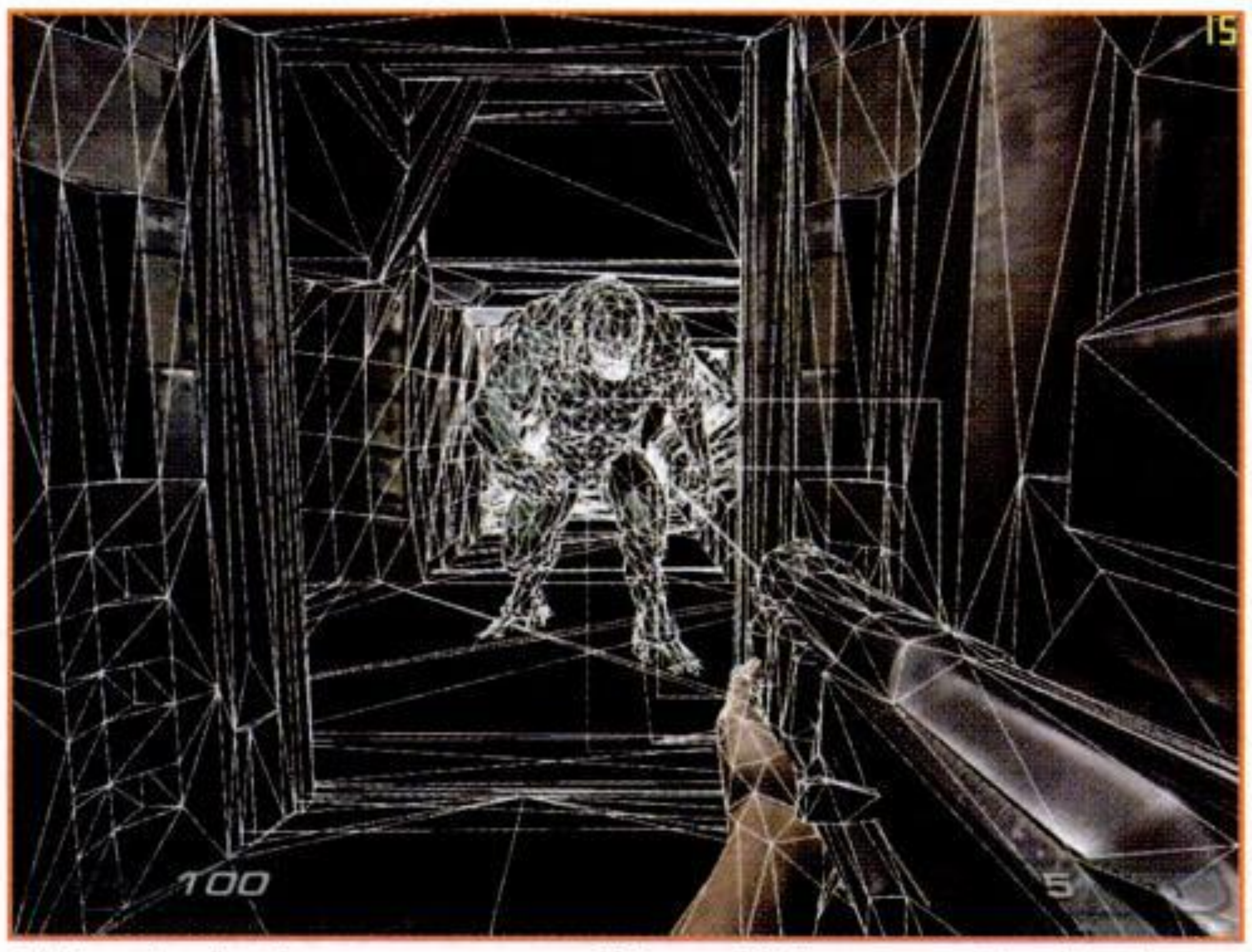
## *Doom 3* represents a massive technological leap. But how does the engine work? *Maximum PC* explains all...

*Doom 3* is without a doubt the most technically advanced PC game ever built—and will likely retain this bragging right until Unreal Engine 3-based games start to appear in early 2006. From the revolutionary dynamic lighting and shadowing engine to the hyper-realistic textures, the game surpasses all others in its real-world mimicry—if you call a demon-infested base on Mars the real world, that is.

What's really amazing about id Software's tremendous effort isn't the raw power of the engine, or the incredible amount of art that was created for the game, or even the realistic shadows. No, what amazed us is the wide spectrum of hardware that the game actually runs on. You can run *Doom 3* on hardware that's positively ancient by *Maximum PC* standards and *still* get decent frame rates. Granted, you're not going to be able to run it with all the whiz-bang features turned on. In fact, you won't be able to enable many of the most visually impressive features. But at least you'll be able to play—and it will still look good.



***Doom 3* takes a step closer to gaming's holy grail—photorealism in 3D games.**



**This shot gives you some idea of the complexity involved in every frame of *Doom 3*'s action—no wonder your video card gets so hot after a couple hours!**

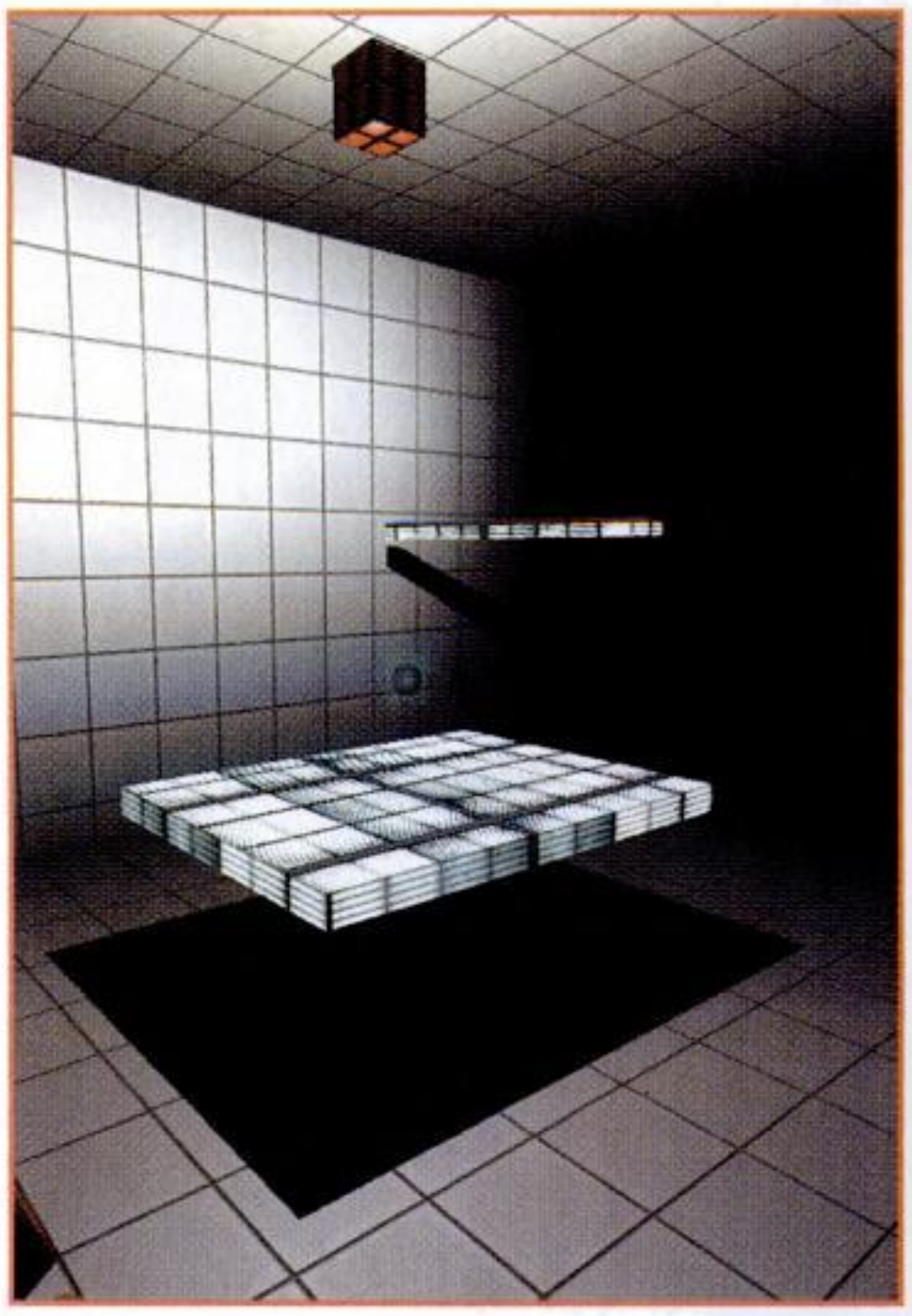
How does *Doom 3* pull off this feat? To find out, let's deconstruct every single aspect of the astounding engine powering the game.

### See Your Doom Coming

The most discussed aspect of *Doom 3* is John Carmack's next-gen graphics engine. Making full use of the latest in programmable shader technology, *this engine* stresses the hell out of any videocard—from ancient, barely supported GeForce4-era cards to the latest, greatest Radeon X800 and GeForce 6800 boards, which can't even run the game at its highest possible detail levels. What requires all this pixel-processing power? Shadows and normal maps.

The secret to the game's verisimilitude is its hyper-realistic lighting model, courtesy of stencil shadows. Drawing stencil shadows is easy—the hitch is that it places a tremendous burden on your system's videocard. Let's take a look at how stencil shadows (sometimes called shadow volumes) work so you can understand why drawing them is so hardware intensive.

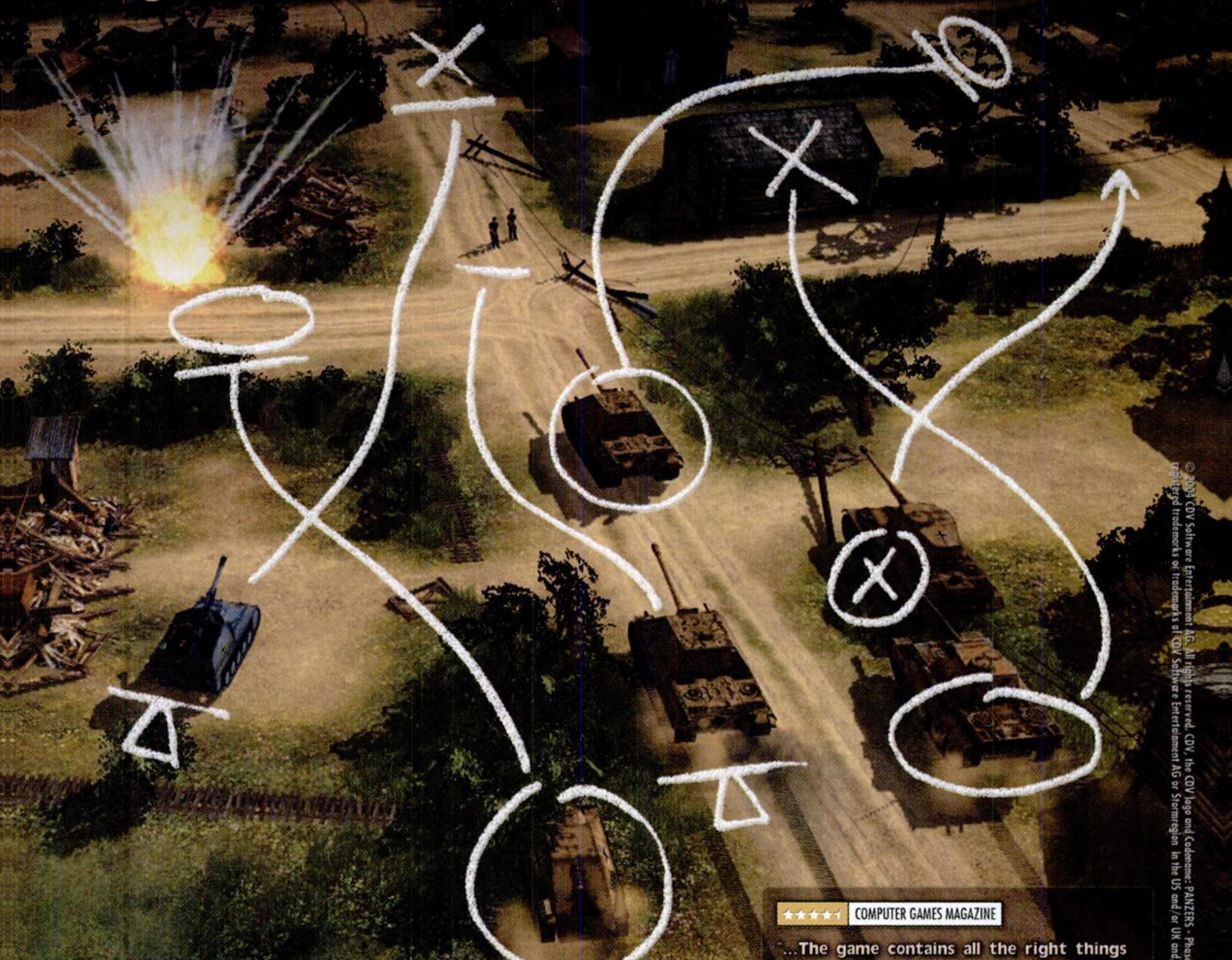
### Doom 3's Shadow Secrets



**In this very simple map, we can see some basic shadows. The invisible shadow volumes fill the area between the white platform and the floor. Doom 3 draws shadows anywhere those volumes intersect polygons.**

Check out the screenshot on the *right*. The red cube represents a light source. The area under the cube should be lit, but there's a platform between the light source and the floor. How do you describe this in a simple computer program? It's easy. Think of the light as being the apex of a pyramid and the four edges of the platform's top as lines that intersect the pyramid's four walls. The area inside the pyramid will be illuminated, except for the area inside the pyramid,

"...A ground-level, earth-shaking game that seems to get what's fun about real-time combat." PC GAMER



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★★★★½ COMPUTER GAMES MAGAZINE

"...The game contains all the right things that came before mixed in a WWII setting to create a game that sits among the best in its genre."

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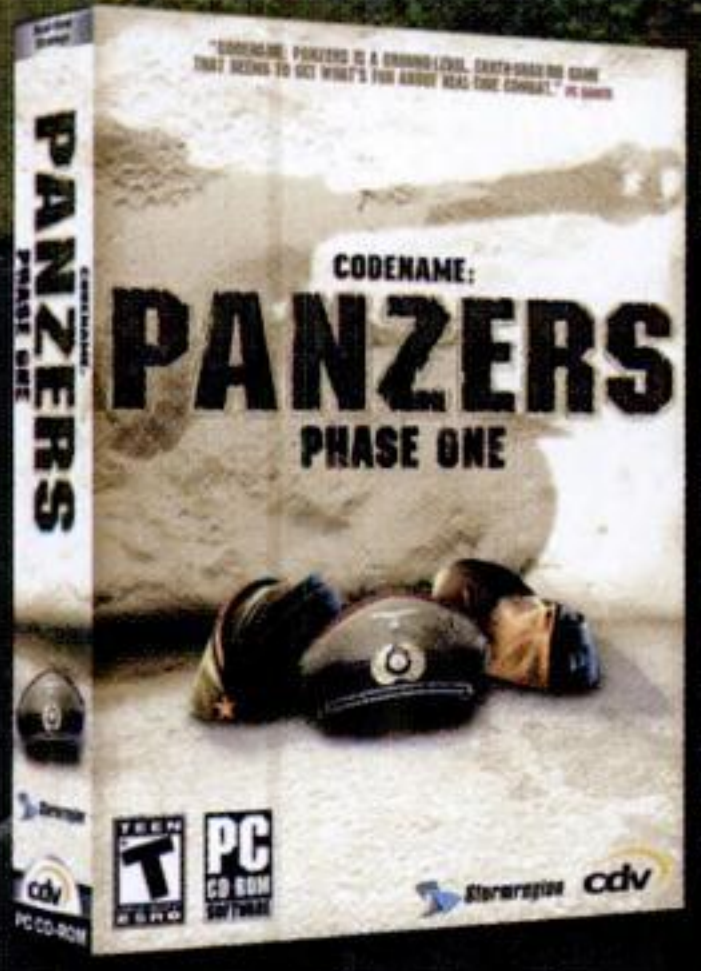

+++ Axis, Allied & Russian campaigns +++ Fully destructible environment +++
+++ Single player & team/versus multiplayer mode - on & off-line +++
+++ Highly detailed graphics for top down strategy or close up action +++

TEEN
T
Blood
Violence
ESRB CONTENT RATING www.esrb.org
Game Experience May Change During Online Play

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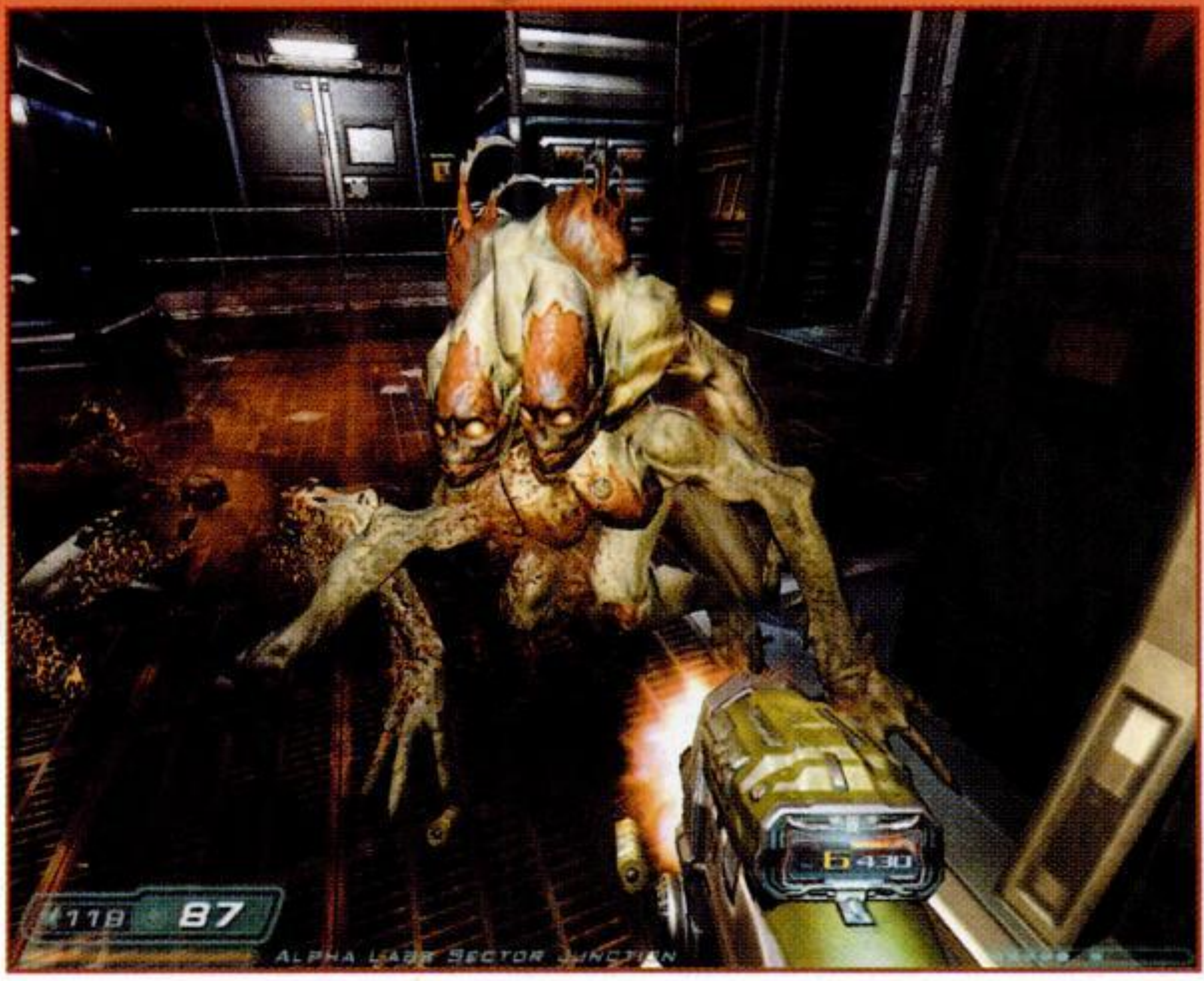


**Note this baddie's normal-map accents and the beastie to his right slowly dissolving on his return journey to Hell.**

beneath the platform, which will be shadowed.

This is precisely how *Doom 3* handles shadows. In our pyramid example, the engine actually draws an invisible polygon where the shadow appears. The engine draws shadows on any object that enters the invisible volume polygon. The trick is that *Doom 3* draws these invisible shadow volumes for *every* light source and *every* object in the game. Even with just two or three light sources, the number of invisible polygons quickly gets out of hand—they may be invisible, but they still consume precious GPU resources. Now consider that everything from the swinging light overhead to the muzzle blast of your shotgun is a light source: That's a boat-load of polys!

## Nothing Normal About It

Dynamic shadows don't account for all of *Doom 3's* eye candy. Normal maps are also used to add an extra level of detail to the character models and lots of the game's surfaces. Here's how they work.

Bump maps have been used in games for a long time now. They're nothing more than simple gray-scale textures that encode the height of each pixel on the texture. When applied to an otherwise flat surface, they convey the illusion of depth. However, bump maps have a problem: Because they only modify the height of a flat surface and don't actually modify the geometry of the surface, collision and clipping problems occur when you use bump maps on polygons that move—like the polys in a human face.

The solution to this problem is the normal map, which not only contains the height of each individual pixel on the base surface, but also encodes the direction that each pixel is facing. With this information, a modern GPU can actually draw the model with the extra polygons described by the normal map, and clipping and polygon collision is no longer a problem.

Basically, game designers can create a model with millions of polygons, then run it through a filter in their 3D modeling software that will convert the high-poly model to a low-poly model and a normal map. In *Doom 3,* normal maps and 6,000-poly models are used to draw monsters that appear to have all the complexity of the high-resolution originals!

## Shader Secrets

Think we're finished with *Doom 3's* renderer? Think again. The final stroke in the Carmackian trifecta of 3D engine design are the dozens of little shader effects strewn liberally throughout the game. The shockwave effect that occurs near a rocket or grenade explosion, the shimmer of heat around steamy pipes, and the melting-away that claims so many corpses are all created with simple pixel- and vertex-shader programs: small programs that can modify data at different points in the 3D pipeline.

## Physics Prowess

It's fairly obvious that realistic physics modeling is one of the next major frontiers in game design. Nearly every game available today—from first-person shooters to real-time strategy games—uses some form of physics engine. In making *Doom 3*, id Software chose to create its own, rather than using a popular off-the-shelf physics engine like Havok or MathEngine.

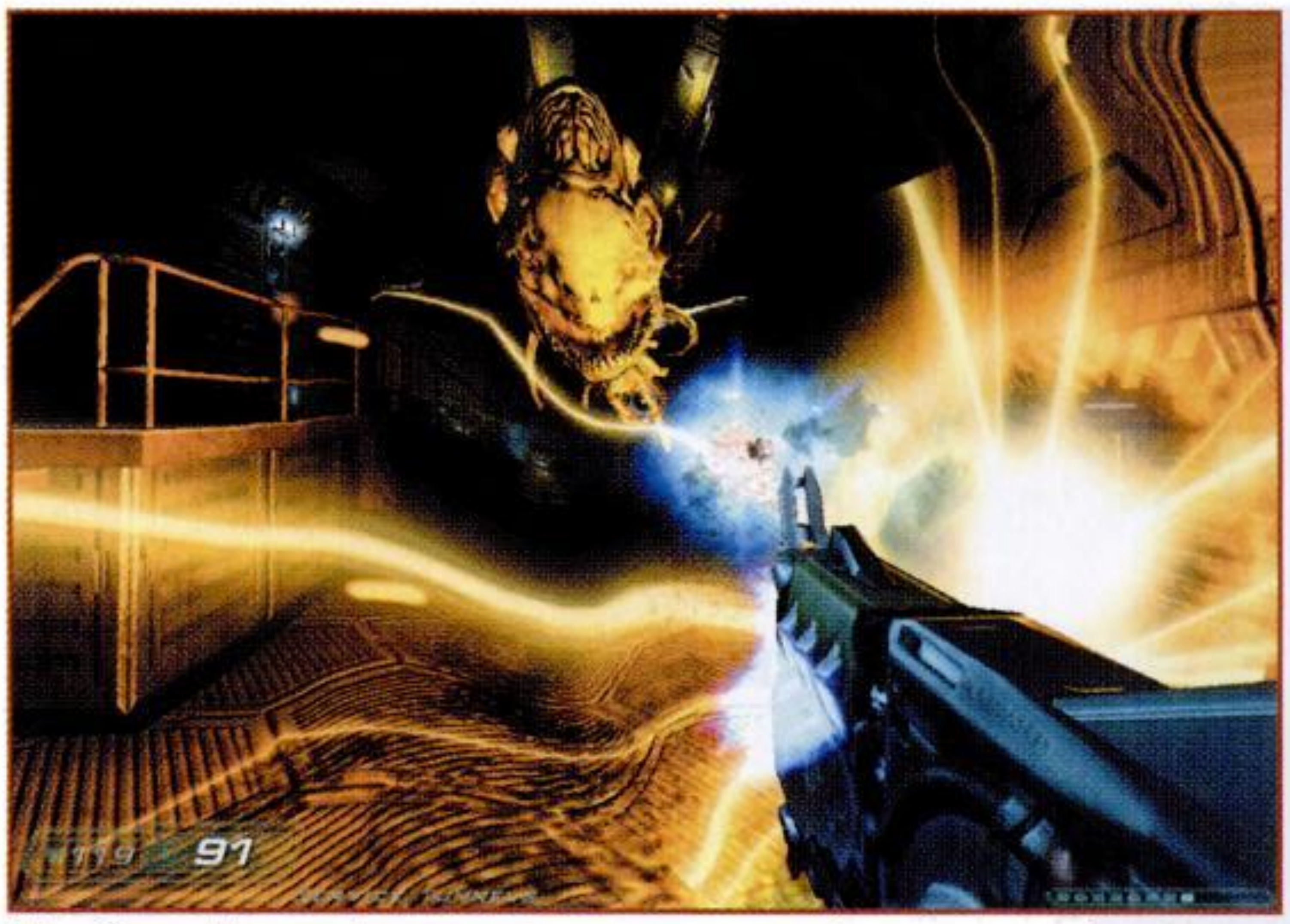
*Doom 3's* physics engine doesn't push the envelope in a big way—it doesn't really distinguish itself from middleware physics engines—but it at least delivers everything we've come to expect from Havok-based games, including ragdoll physics that produce incredible dynamic death animations, realistic fire physics, and many of the realistic weapon effects, all of which are based on approximations of real-world physics calculations.

## CPU-Generated 3D Sound

*Doom 3's* sound engine has been the subject of much controversy. Unlike most games' sound systems, *Doom 3* shuns the Windows-only DirectSound API in favor of a more general, host-based approach. Performing all the 3D sound calculations on the CPU offers several benefits: The game isn't limited at all by the limitations of DirectSound, and the developers can programmatically modify in-game sounds. In addition to creating a variety of sounds for each type of object—some bullet impacts have seven different sound variations—the engine can also modify sound on-the-fly using small sound shaders. We've heard id uses sound shaders to create even more variation in the frequently repeated sound effects (Editor's Note: The folks at id declined to make themselves available for comment for this article.)

The result is that playing *Doom 3* with an above-average 5.1 speaker rig is truly a religious experience. You hear the world come alive all around you. We frequently heard audio cues in the game that gave us advance warning of some hellspawn's ambush, and the creepy-crawly tip-tip-tap of the spider demons still gives us chills.

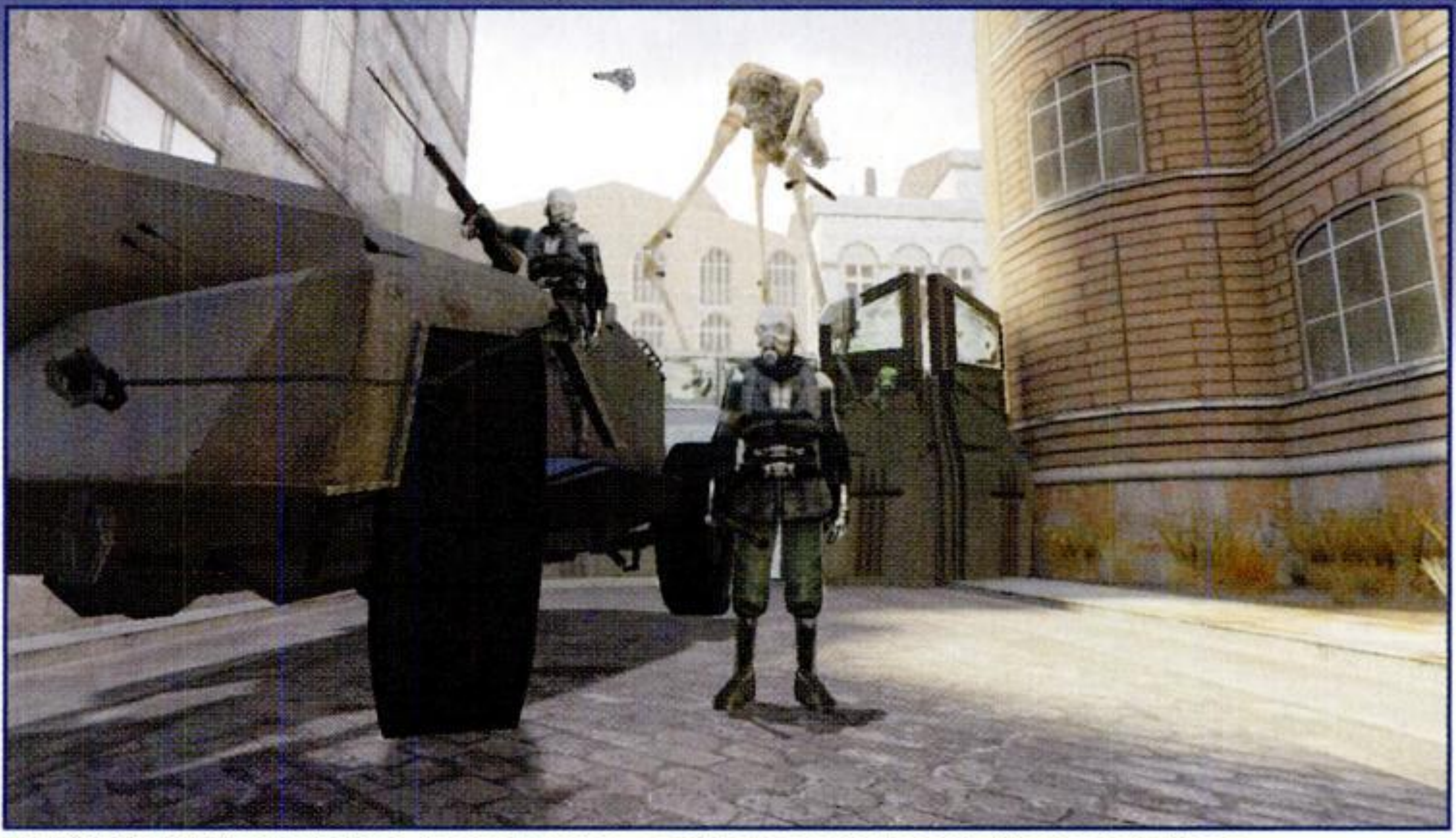
Of course, only time will tell how long Doom 3 will reign as king of the 3D engine heap. With *Half Life 2* on the horizon, and *Far Cry* nipping at its heels, its days may be numbered, which is only good news for you, the gamer. Regardless, you can bet the farm on the fact that the Doom 3 engine will be powering scads of third-party games over the next several years.



**The Cacodemon's energy weapon creates a space- (and mind-) bending effect on impact. The secret? Two words: programmable shaders.**

# Valve Software's Source Engine

## *Half-Life 2*'s core technology focuses on delivering more realistic, dramatic characters



***Half-Life 2*: New game, new engine, a whole new level of expectations.**

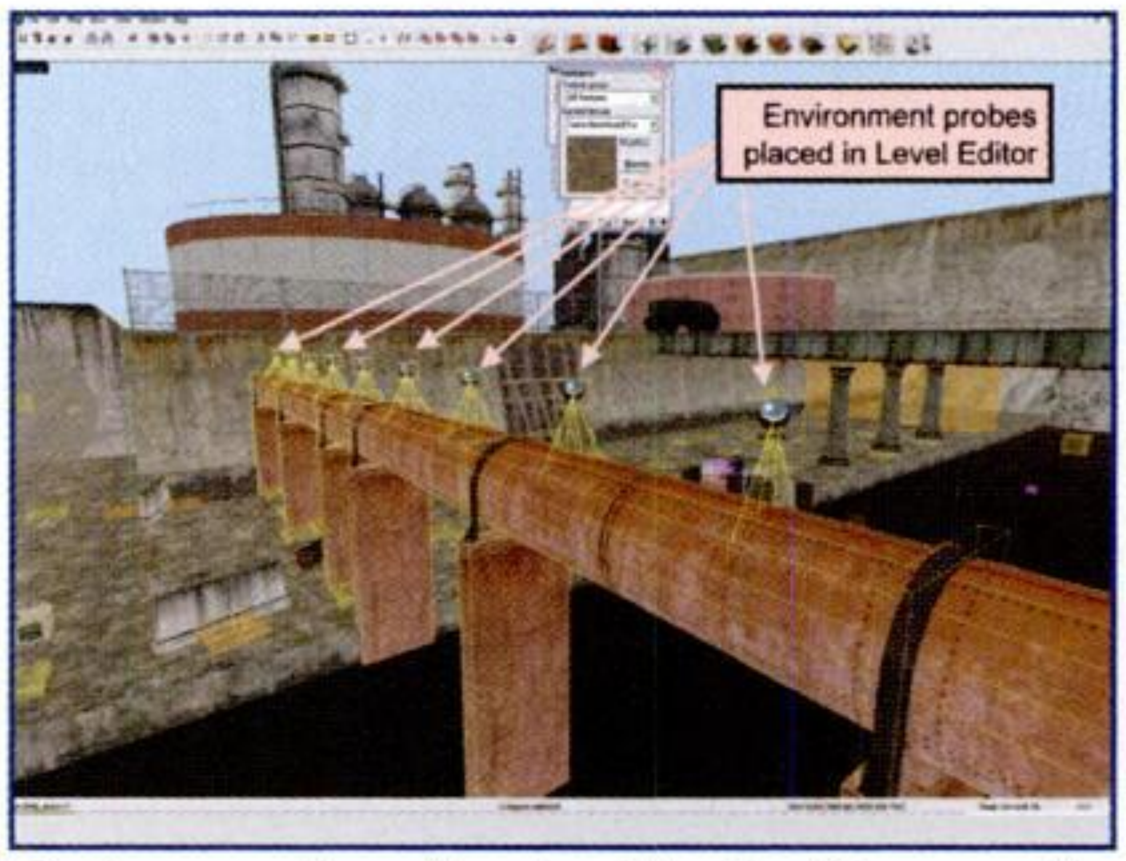
When *Half-Life* came out in fall 1998, it was an instant worldwide sensation, and it went on to win countless Game of the Year awards while being widely hailed as one of the best games *ever* made. (Indeed, it's on our list of the Ten Best 3D Games of All Time, see page 88.) The scripted sequences were delivered seamlessly, the AI actually did more than blindly rush you, and the game effortlessly flowed from one nail-biting sequence to another.

And all of that took place on the back of a heavily-modified version of the original *Quake* engine, not exactly a technical marvel at the time. Given the amount of work that Valve spent modifying the *Quake* engine (which it licensed from id Software), it's not surprising that for *Half-Life 2,* they decided to create their own engine.

"After we completed the first *Half-Life* and the SDK," explains Yahn Bernier, senior software engineer at Valve, "we began determining requirements for our next set of games...we went and visited with other companies in the engine-licensing business. At the end of the day, we didn't quite find enough overlap between what we were interested in doing and what was then available, or on the horizon. The main philosophy [at Valve] has always been to view technology as an enabler for great user experiences."

To that end, Bernier and the other programmers at Valve definitely had their work cut out for them. Not only would *Half-Life 2* need to feature state-of-the-art 3D graphics capable of supporting normal-mapping and diffuse and specular bump mapping (thus fully exploiting DirectX 9-based 3D hardware), but the engine would also be called upon to deliver realistic character acting, advanced AI, physics, and rendering.

"We really pushed hard into a few areas," says Bernier. "I think the hardest things to get right were some of the facial rigging and eye- and teeth- rendering models, getting a flexible rendering pipeline running, integrating a third-party physics library in with our existing game physics routines, and figuring out an efficient tool and production pipeline for our mappers and licensees."

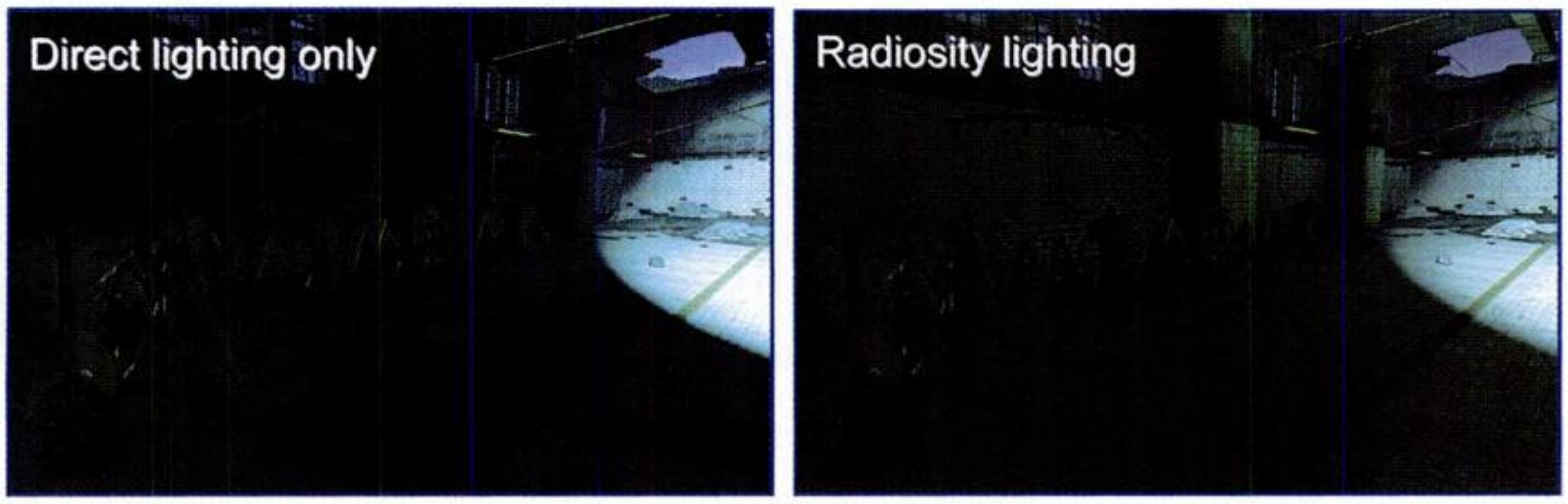


**Designers place "probes" in the Source editor, called Hammer, to define various audio and lighting effects in the game.**

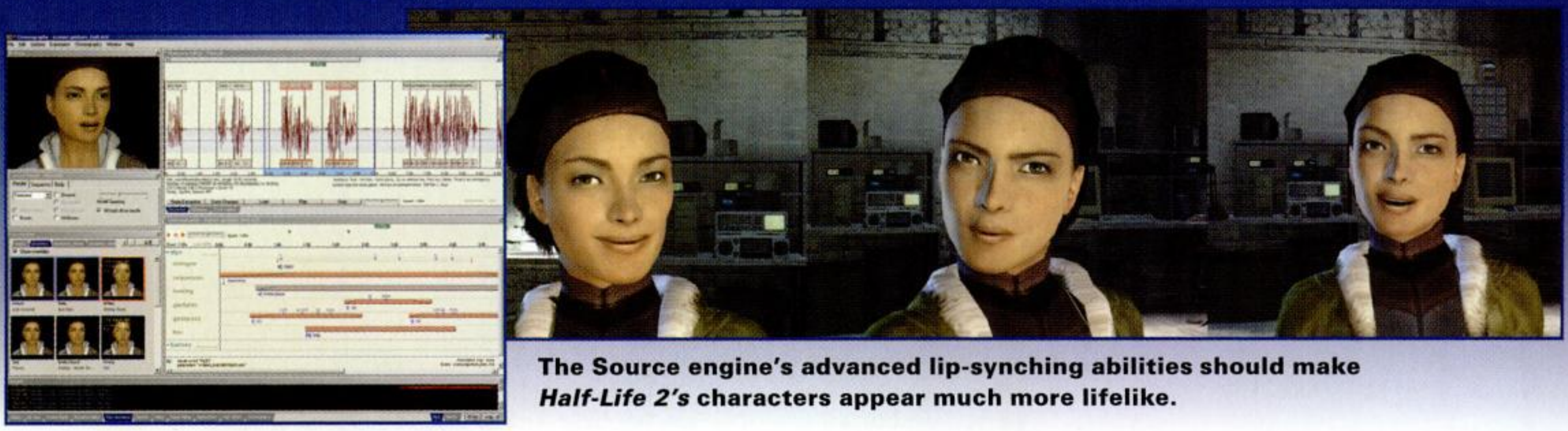
### The Technical Pay-off

Those efforts look to have paid off—if our latest hands-on experiences with *Half-Life 2* are any indication. The Source engine features an astounding particle and lighting system that renders floating dust specks, real-time lighting, and mirror effects. And most impressively, the engine can deliver expansive outdoor areas through the use of bump-mapping, which means that *Half-Life 2* doesn't have to endure the same limitations that the original game did.

"One major problem with rendering wide-open areas is creating enough detail to make it match with the level of detail you can achieve with indoor scenes," says Brian Jacobson, senior software engineer



**The image on the left shows just a single "direct light" source effect in the Source engine. The image on the right show the same scene with a radiosity effect applied, which models the diffuse aspects of fading light within a given scene.**



**The Source engine's advanced lip-synching abilities should make *Half-Life 2's* characters appear much more lifelike.**

at Valve. "We've attacked that problem by adding more detail to the scene using bump-mapping in conjunction with our displacement system, prop renderers, and our water shaders."

The end result: When you see an outdoor area in *Half-Life 2*, it's a *real* outdoor area, not a cobbled-together trick, and it will hold true to the level of detail you'll encounter indoors.

### Creating More Realistic Characters

With *Half-Life 2's* emphasis on delivering a strong narrative experience, the Source engine's ability to create realistic and lifelike characters could be its "ace in the hole." Every character and NPC in the game is built with a musculature beneath their clothing that flexes and moves correctly. (Move a character's arm and you'll see the muscles act appropriately.) Also, as an NPC's head moves, their eyes adjust as they would in real life.

The truly dramatic aspect of the NPCs is the lip-synching. The Source engine was built with integrated lip-synching technology that automatically recognizes an audio file (like a .wav) and each NPC's lips and face are programmed to automatically recognize what is being said and animate correctly. That means that mod makers simply need to record a .wav file, plug it in, and the Source engine handles the rest. This will save a massive amount of time for both developers and mod makers, since the lips won't need to be animated by hand.

All of those impressive features could have upped the hardware specs considerably, but Valve wanted the Source engine to be scalable so that someone playing the game on a low-end machine would enjoy it just as much as someone playing the game on the world's fastest gaming rig.

According to Bernier, Valve accomplished that task by building in a lot of knobs and fallbacks to various systems. Most of that falls in the area of either swapping out game content—such as replacing high-resolution textures with lower-resolution art—or decimating game content altogether so that everything runs on machines with limited memory and CPU power.

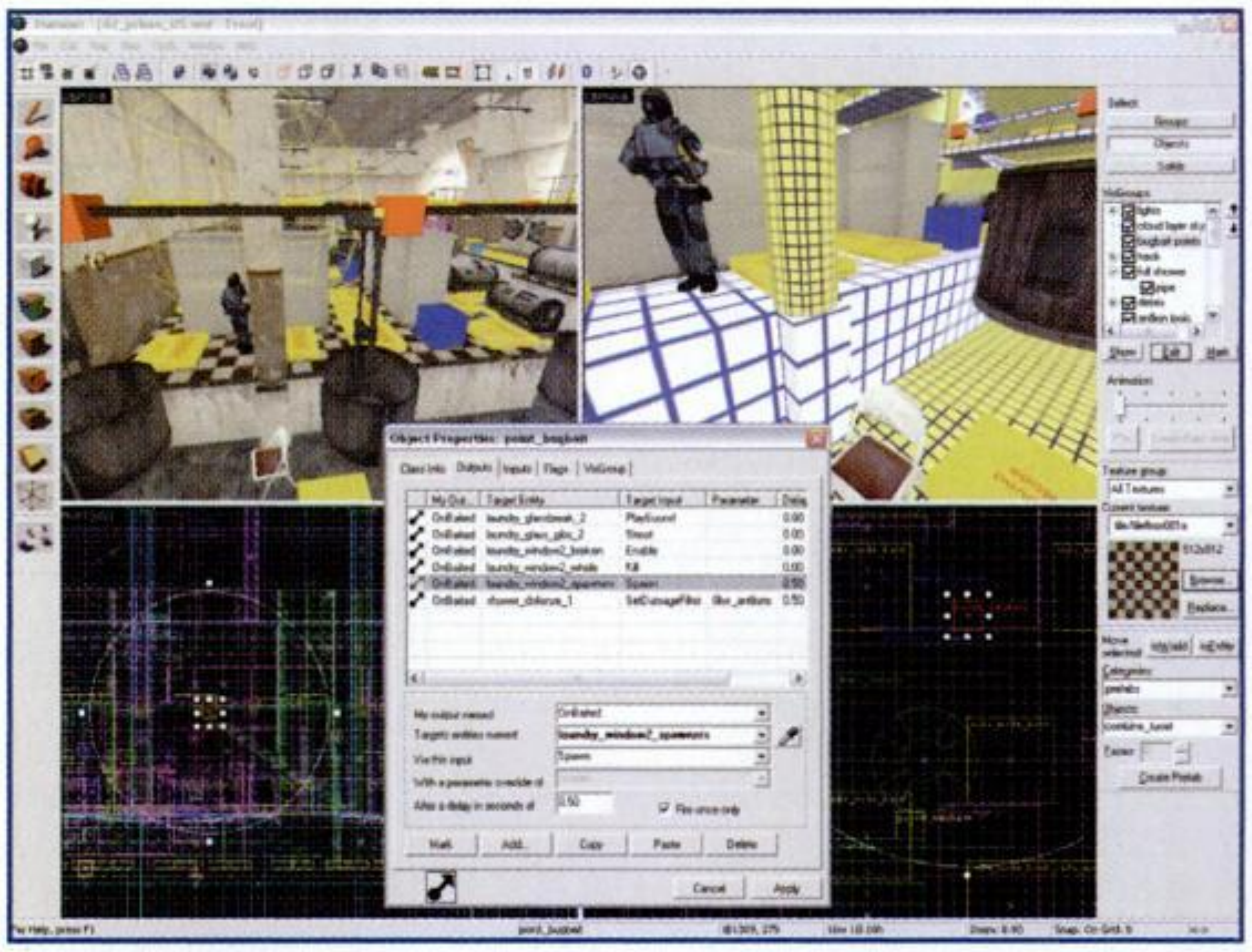
## Source's Vital Ingredients

***Rendering:*** Dynamic lights; vertex lighting and light maps; many light types, including flickering and pulsing. Water with refraction and fresnel effects. 3D skyboxes extend the horizon and add parallax on distant objects.

***Materials System:*** Defines sets of materials that specify what an object is made from and the texture used for that object. A material specifies how an object will fracture when broken, and defines its mass and buoyancy.

***Multiplayer Network Code:*** Predication analysis for interpolating collision/hit detection, which is designed to improve performance and reduce lag.

***Physics System:*** Kinematic animated bone followers; AI characters can interact with physically simulated objects.



**Thanks to the Hammer editor, the Source engine is one of the most modable engines around.**

"The flip-side," Bernier says, "[when it comes to] supporting machines that aren't even out yet, requires that you author your content for what you think the target machine will be a few years down the road. Other considerations are building a rendering abstraction that allows for upgradeability. For instance, our abstraction to shader programming has made putting Pixelshader 3.0 shaders into the Source engine very straightforward."

### Total Mod Support

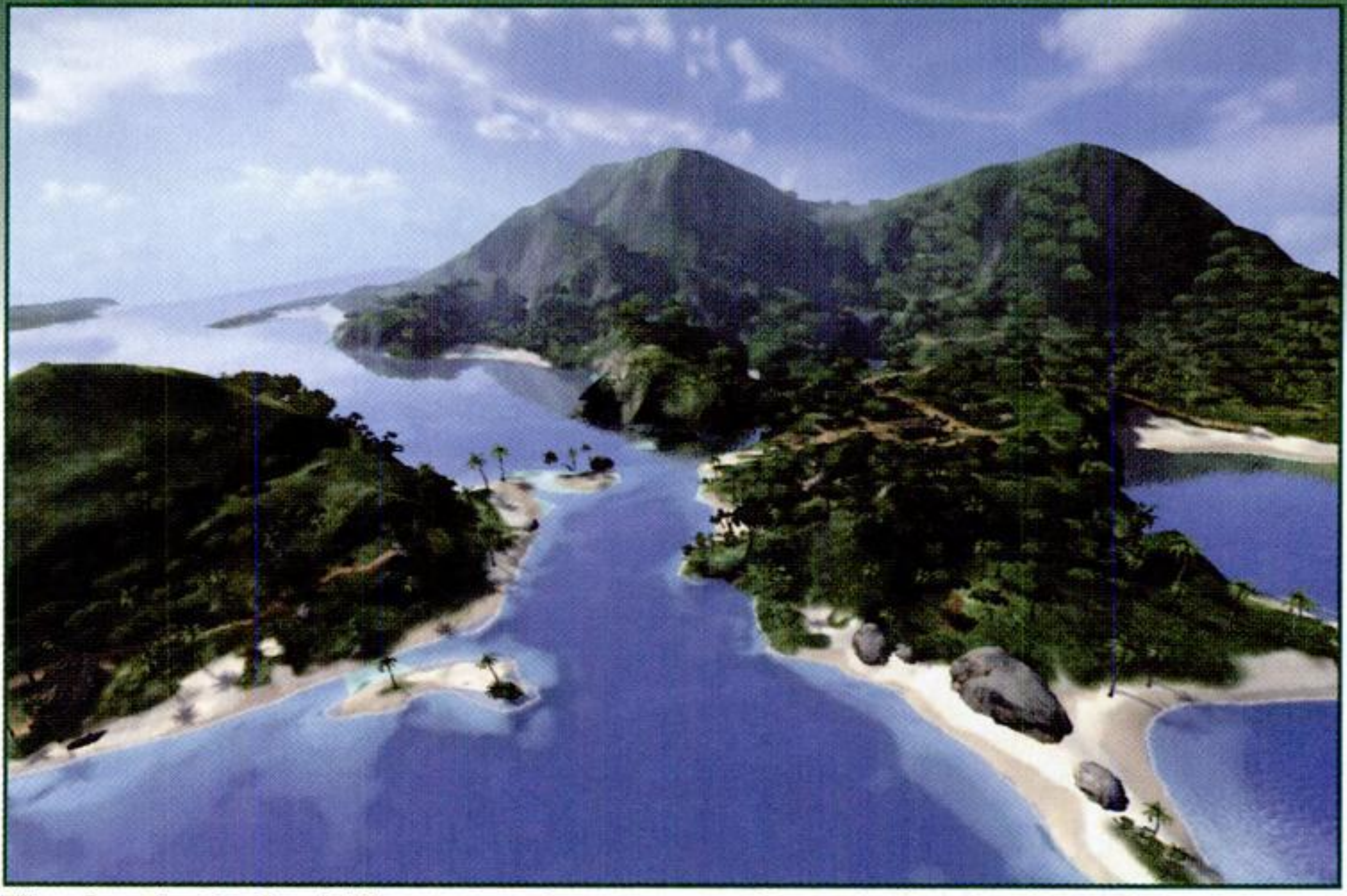
As everyone knows, what helped elevate the original *Half-Life* from a fantastic game to a sales-shattering behemoth was the game's modability. The number of classic mods that were released for *Half-Life—Counter-Strike*, *Day of Defeat*, and *They Hunger*—ensured the game was always at the forefront of gamers' minds. And with the Source engine, that trend should begin anew.

"This engine will be far more modable than the original *Half-Life* engine," explains Bernier, "which most consider to be one of the most mod-friendly engines ever built. Modders will have complete control over the rendering loop, more control over the networking system for multiplayer, and detailed control over most other game aspects, including significant client-side code for rendering and animation.

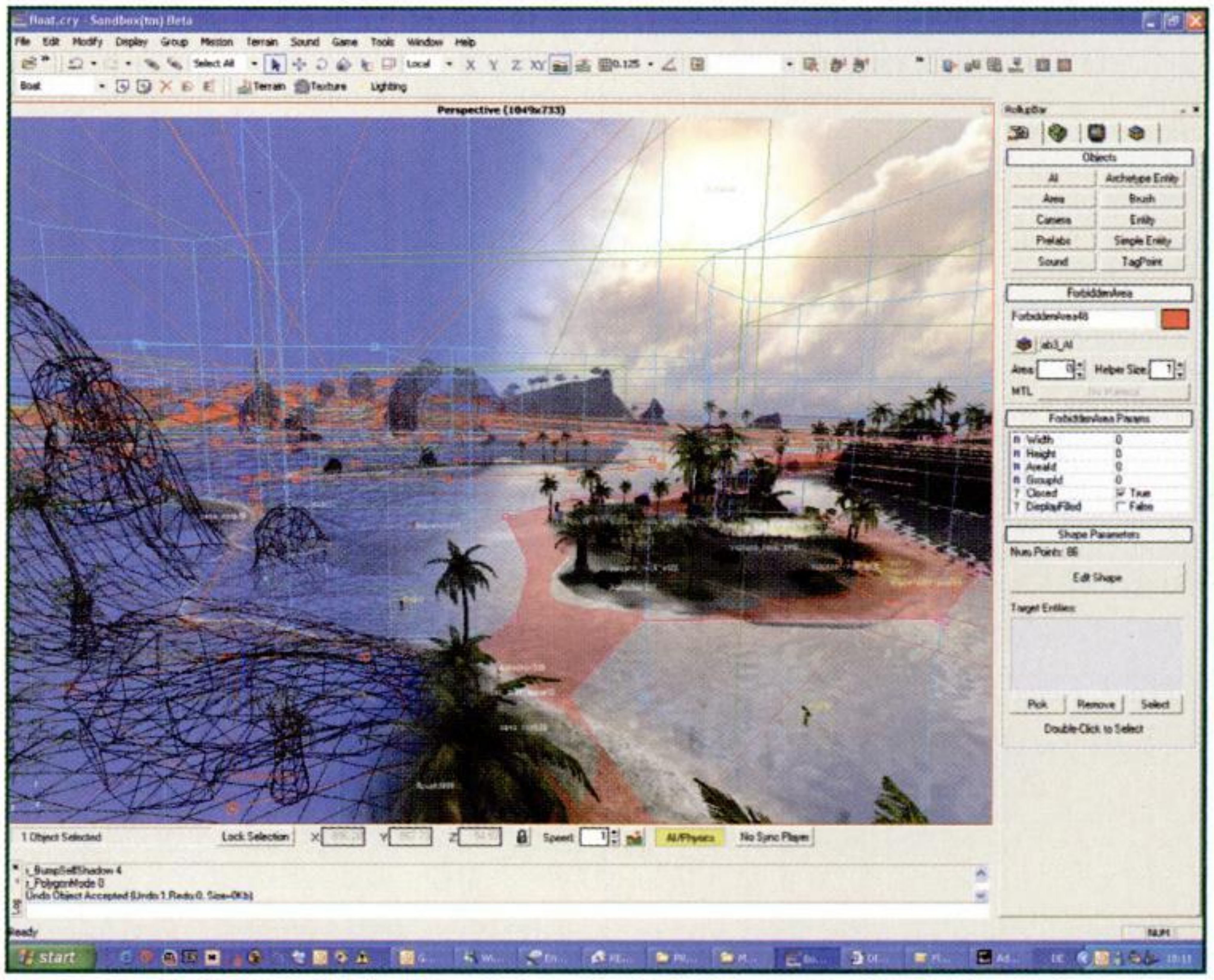
In addition to the two announced licenses of the engine for Troika and Arkane, Valve is also using the Source engine to power the long-delayed *Team Fortress 2*. We should be seeing more of this promising 3D technology for the next several years. Our crystal ball tells us the Source and *Doom 3* engines will run neck-and-neck in the race for developer mindshare for at least the next 12 months.

# Crytek's CryEngine

## *Far Cry* has served notice to the industry that there's a new kid on the 3D technology block



The CryEngine's ability to render vast outdoor scenes is unrivaled—at least for the moment.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CryEngine's outdoor rendering recipe? Heightmaps, mip-maps, and polygon reduction.

There's no question that 2004 will go down as the year of the shooter. With the release of games like *Doom 3* and the upcoming release of *Half Life 2*, the genre that put computer gaming on the map has one again claimed its rightful position at the top of the industry's food chain. But the shooter that really astounded everyone this year (and seized a mammoth's share of acclaim) wasn't from Valve or id, it was from a new German developer called Crytek. The game was *Far Cry*.

Instead of being set exclusively in a dank dungeon or a burned-out space station on the outskirts of hell, Far Cry didn't shy away from casting the action against the backdrop of large, spacious external environments. Instead of claustrophobic corridors, *Far Cry* features lush, tropical jungles complete with swaying palm trees and ferns, massive waterfalls, and forests packed with trees. In other words, the CryEngine, the 3D technology behind *Far Cry*, delivered what many people thought was impossible. And it delivered it brilliantly.

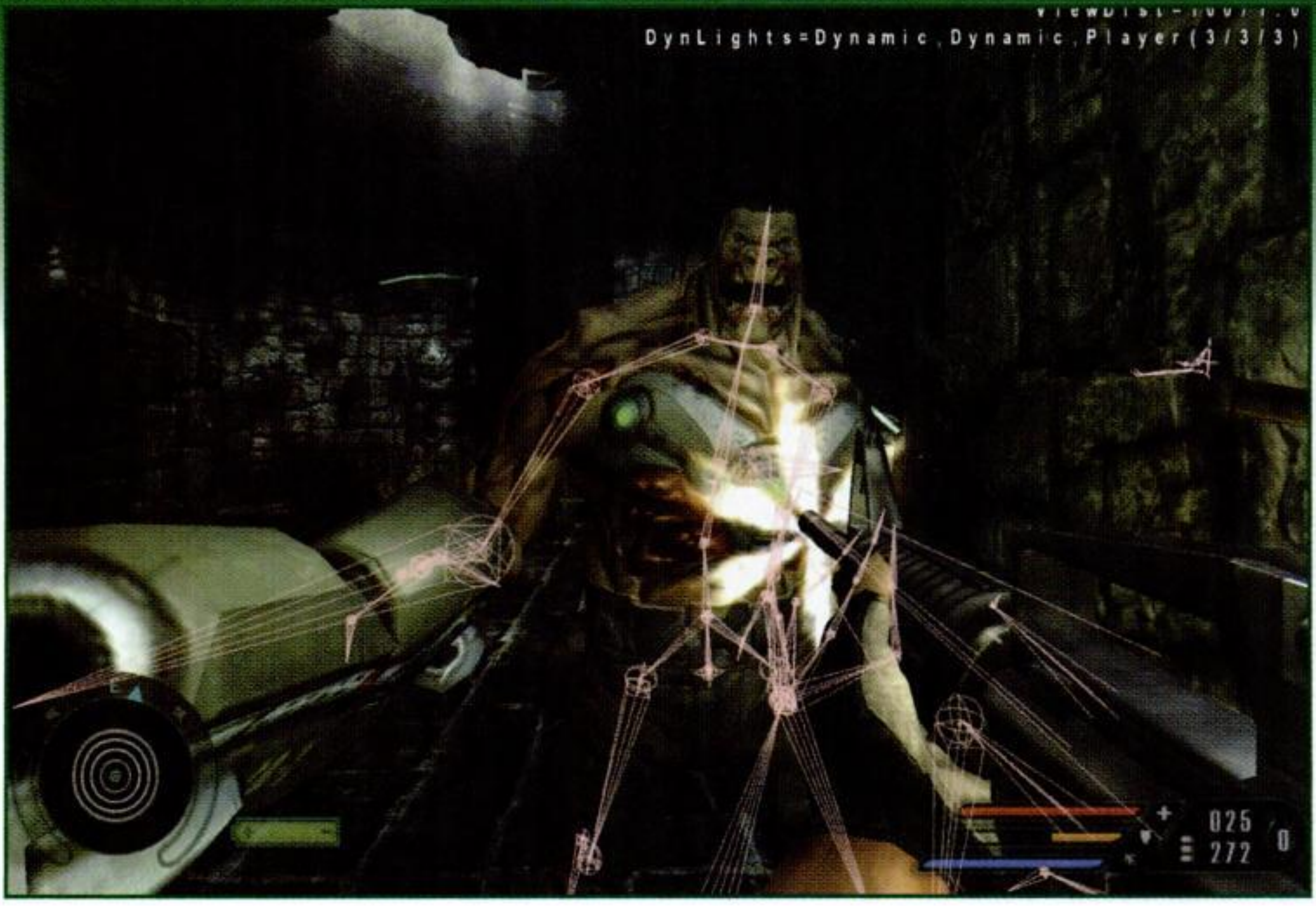
"Today's hardware can handle it [rendering large outdoor environments] if you feed the data correctly," explains Caveat Yerli, technical and creative director at Crytek. "In our engine, large-environment support is based on good implementation of level of detail and data management."

### How Do They Do It?

The CryEngine is able to render *Far Cry's* vast landscapes by using an advanced heightmap system and polygon reduction. The heightmap system defines the basic underlying shape of the terrain, which is derived from a greyscale map. The greyscale values are converted into a polygonal network with height information. In turn, the terrain is subdivided into patches of polygons upon which Crytek applies mip-mapping of heightmaps to reduce the polygon counts of each patch in the network. By using this method, the CryEngine is capable of creating view distances of up to 2km within the game world, at solid frame rates, which trumps the competition soundly at the moment.

But what really made *Far Cry* such a sensational game was the CryEngine's ability to effortlessly create stunning exterior *and* interior environments. One moment you're battling mercs in a steaming jungle, and the next you're slugging it out against fiendish mutants in an abandoned science lab.

The CryEngine's shader technology, which features real-time per-pixel lighting, bumpy reflections—a surface whose reflection is distorted by a bump-component (derived from a normal map or bump-map)—refractions, and volumetric glow effects, really kicks in during the interior sequences of the game. Coupled with the engine's prowess with exterior scenes, the result is a game that looks fantastic no matter where the action is located.



***Far Cry*'s baddies are not only challenging (thanks to solid AI) by they look pretty dang good, too, courtesy of a detailed skeletal animation system.**

## Revolutionary AI

It's a lot of fun to bandy about cool-sounding terms like "volumetric glow effects," but without exciting and fun gameplay, those phrases don't mean a whole lot. Thankfully, because of its ability to create an open-ended gaming experience and realistic enemy AI behaviors, the CryEngine ensures that every second of *Far Cry* is a nail-biting, gut-wrenching experience.

"The [enemy] AI responds to the actions of the player," says Yerli. "There is no pre-defined script to tell the AI what to do. It constantly samples its environment and takes action whenever something out of the ordinary happens. In this way, the player is not forced to do the same thing every time he plays—instead, he is free to choose his attack strategy and unique ways in which he engages the enemy."

As anyone who has played *Far Cry* can attest, that statement is not hyperbole. Indeed, each encounter could play out in a variety of different ways, depending on your actions and how the NPCs in the world respond to each other.

Contrary to popular belief, Yerli believes that AI is not difficult to program. Instead, determining which type of AI—static, positional, scripted, evolution, or learning—to use in a particular game is the real challenge. And Yerli is against creating real, human-like AI for games.

"Realistic AI wouldn't make for a particularly fun combat encounter," he believes, "since the natural instinct of humans in the face of danger is to hide or run away."

Another common problem for programmers is having AI routines consume large portions of your computer's resources. The CryEngine was designed and built with that problem explicitly in mind.

"With the CryEngine, the AI routines are handled by the main CPU," Yerli says. "They [AI routines] are programmed in such a way that they never tax the PC in a way that overly sacrifices game performance. The individual AIs have an update frequency of roughly 10 times a second, and the system tries to update as many enemies as possible during one render frame without compromising the overall frame rate."

## Gorgeous Mods

The innovations of the CryEngine extend to its ability to let gamers design and create their own levels and mods. Utilizing the CryEngine Sandbox, modders can create levels in real-time and then quickly jump in and try them out; Crytek calls this "what you see is what you play" editing. And it really is as seamless as it sounds.

"Soon we will be releasing the full CryEngine Mod SDK for *Far Cry*," Yerli says, "which will allow players to create total conversions. The Mod SDK will include exporters, plug-ins, documentation, and examples and sources."

Although Yerli wouldn't give us specifics about what other games might be using the CryEngine (he simply said that licenses have been sold to both Korean and U.S. companies), we do know that Crytek recently entered into an agreement with EA to create a new game series for them. With a homerun out of the gate in *Far Cry*, both Crytek and the CryEngine may just be getting started on a long and productive run.

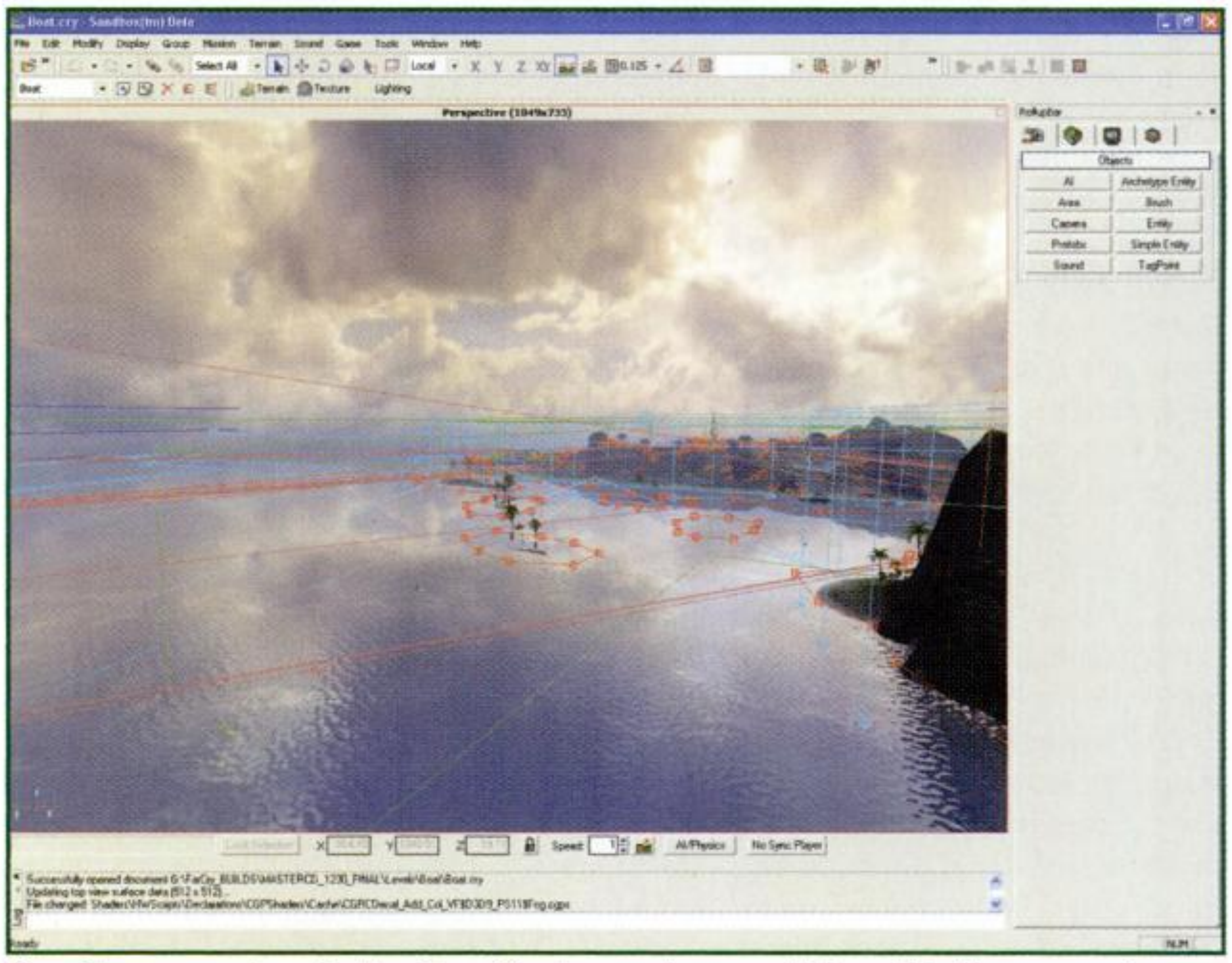
## CryEngine's Vital Ingredients

**Renderer:** Integrates indoor and outdoor technology seamlessly. Offers rendering support for OpenGL and DirectC 8/9.

**Physics System:** Supports character-inverse-kinematics, vehicles, rigid bodies, and liquid, rag-doll, cloth, and soft- body effects.

**AI System:** Enables team-based AI and AI behaviors defined by scripts. Ability to create custom enemies and behaviors without touching the core C++ code.

**Lighting and Shadows:** A combination of pre-calculated, real-time shadows, stencil shadows, and lightmaps to produce a dynamic environment. Includes high-resolution, correct perspective, and volumetric smooth-shadow implementations for dramatic and realistic indoor shadowing.



**Creating new levels for *Far Cry* is made possible with the game's inclusion of the CryEngine Sandbox editor. Crytek plans to release a full SDK, which will enable players to create total conversions.**

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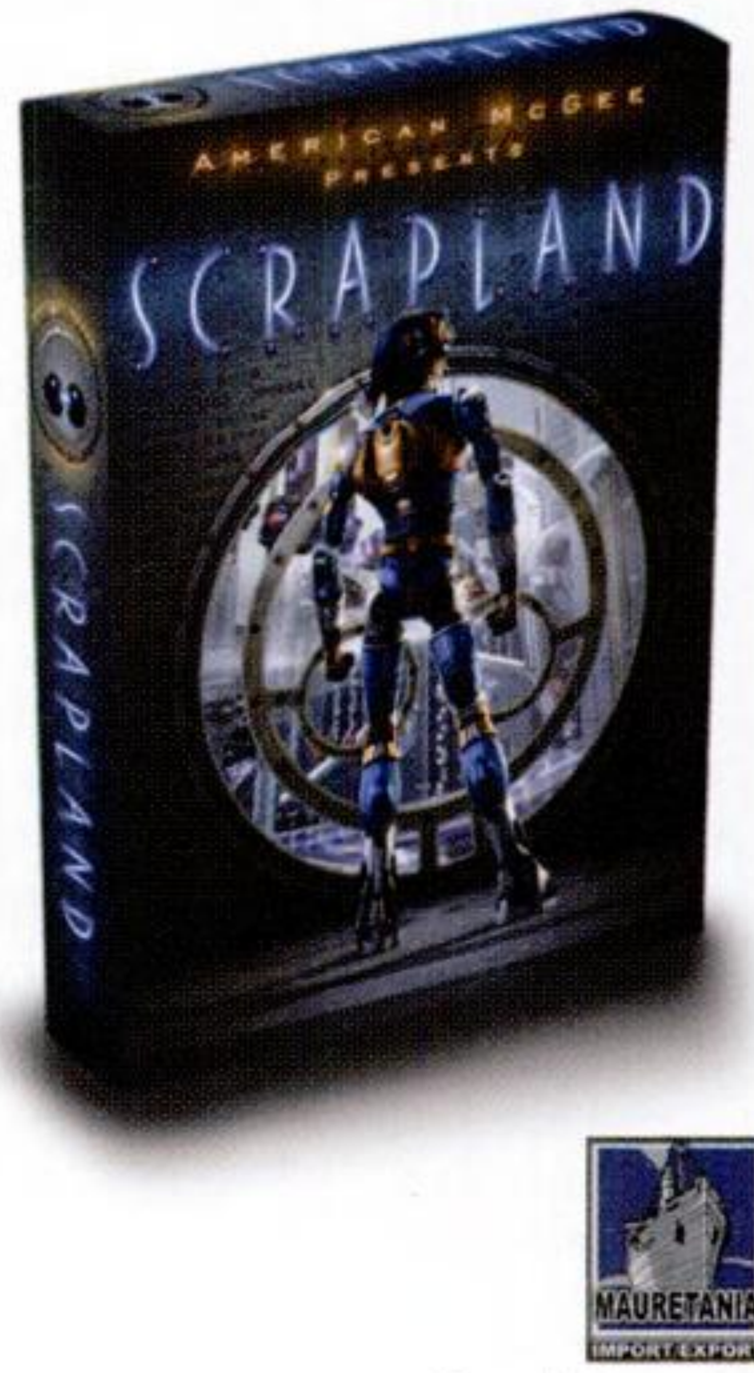
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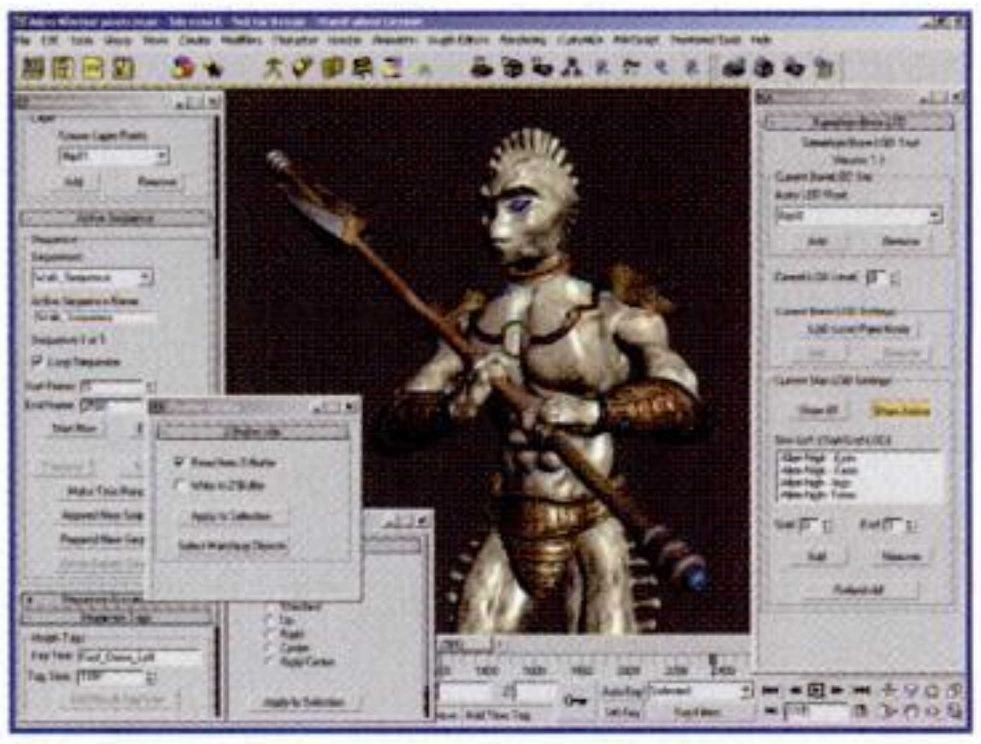
# NDL's Gamebryo Engine

## The most prolific 3D engine you've never heard of

**Betcha didn't know: *Morrowind* was created with a modified version of NDL's NetImmerse engine, the predecessor of Gamebyro.**

There's no question that 3D engines like Source and Doom 3 get the lion's share of attention from gamers and the press. After all, they're the engines that power the hottest first-person shooters, arguably gaming's most popular genre. However, there are 3D engines on the market that work quietly under the hype-generated radar, powering just as many games, if not more, than their higher-profile cousins. And often, those engines are capable of rendering a wide range of game types and genres, not just shooters.

One of the most productive of these engines is Gamebryo, which is developed and created by Numerical Design Limited (NDL). According to Lars Bishop, the chief technology officer at NDL, Gamebryo was designed from the ground up to be a technology framework that could be adapted for any kind of game that a developer wanted to make.


**Character animation is handled within the Gamebryo engine, which offers a great deal of control over how the characters look and act.**

### The Jack- of-All- Trades Approach

The advantage to this method is that once developers learn how to use the Gamebryo engine, they can use it for any type of game, regardless of genre or subject matter. Bishop sees this as a way of creating a legacy of expertise that is carried over from project to project and is never lost, because the development team doesn't have to learn a whole new technology with each new game. In fact, Bishop says that some studios, such as Bethesda and Mythic, are using the Gamebryo engine across all of their projects. (Bethesda's epic, and extremely unique-looking, RPG *Morrowind* was created with a modified version to NDL's NetImmerse engine, the predecessor of Gamebyro. Mythic used the engine for *Dark Ages of Camelot*.)

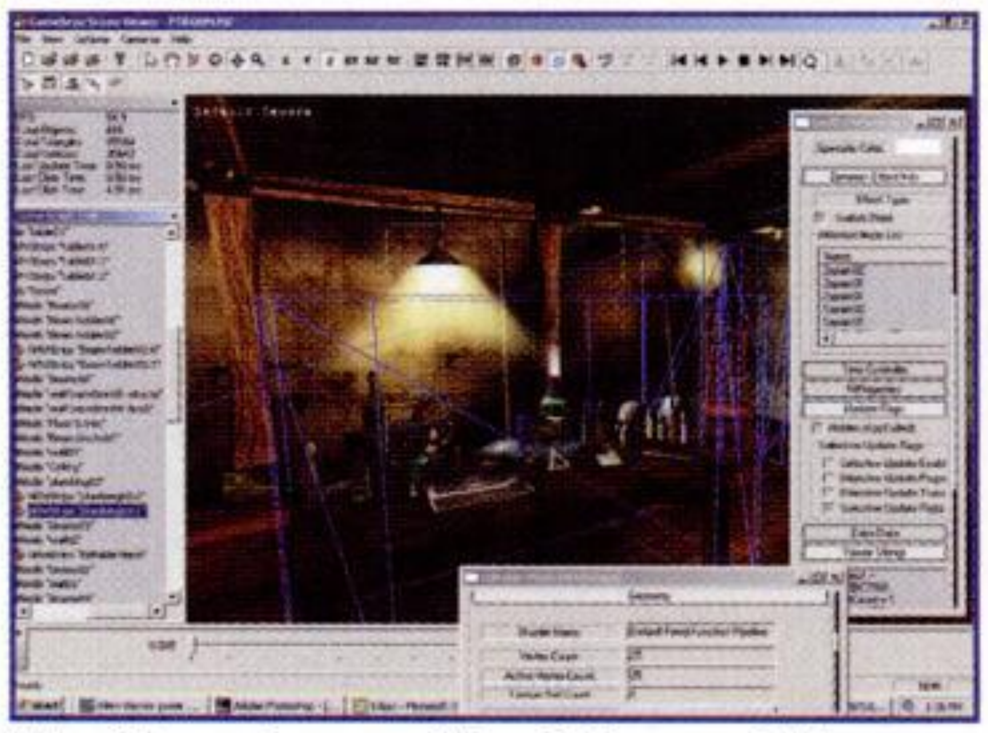
In terms of technical bells and whistles, Bishop tells us that Gamebryo easily compares to the better-known engines, and it includes next-generation DX 9 features like pixel and vertex shaders and all the other toys that a developer would want and a gamer would expect. That said, the emphasis isn't just on delivering an impressive piece of technology to a game developer. It's also important that the developer receive easy-to-use tools that can be quickly learned and mastered. "Engine features are merely raw materials," Bishop explains. "They are nothing without a pathway for the artists and designers to use them in their own creative ways."

### Staying with the Times

As you'd expect, creating an engine that can be adapted to any style of game takes a lot of effort, especially in terms of keeping the technology fresh and cutting-edge. In fact, Bishop says that the constant balancing act between pushing the technology and supplying the tools the artists need to use the technology is an extremely important part of the engine's development process.

"The two must move forward in lockstep to make sure that everyone on the game team can gain maximum advantage," he says.

It may not be the sexiest technology on the market, but with over 100 Gamebryo-powered titles either in development or already available at retail, it's clear that this engine has already established itself as a significant player that will be around for some time. And it just goes to show that not all great gaming technology needs to come out of Mesquite, Texas.


**The Gamebryo editor lets you take a detailed look at a specific scene and modify all its aspects.**

### Gamebryo's Pedigree

**Gamebryo-powered games include the following:**

Dark Age of Camelot • Freedom Force
Playboy: The Mansion • Kohan II: Kings of War
Star Trek: Bridge Commander • Empire Earth 2
Morrowind • Freedom Fighters

### The Details: Gamebryo

**Lines of Code:** 800,000+
**Time to Create Engine:** 40+ man years
**Programmed on:** PC
**Programming Language:** C++
**Size of Team:** 18
**Hardware Requirements:** Varies from low- to high-end
**Cost of License:** $50,000

# Epic's Unreal Engine 3

**On the DVD!**

## The first 3D engine to give id a run for top technical honors looks better than ever! In fact, it may soon be the technology id and company are gunning for...

**Unreal Engine 3 characters look... unreal. See for yourself on the DVD.**

When *Unreal* was released in May 1998, it heralded the age of the 3D engine wars. No longer would id be the only name synonymous with the greatest 3D engines; now there was a new contender on the block, and Epic was here to kick some serious ass.

And kick ass it did. After all, who can forget the glorious spectacle at the beginning of *Unreal*? Shortly after staggering out of your crashed prison ship, you come over a crest and before you are a massive lake and a majestic waterfall. Birds circle slowly on the thermals overhead. If there was ever an expletive-inducing moment in a game, this was it.

Six years have passed since that momentous occasion, and the Unreal engine shows no signs of slowing down. The 3D engine that has powered countless high-profile games—including *Deus Ex*, *Rainbow Six 3*, and *Splinter Cell*—is now entering its latest phase of updates and refinements. And the features Unreal Engine 3 promises are nothing short of revolutionary, including a tenfold visual improvement compared to *UT2004*. (See our exclusive movie demonstrating the Unreal Engine 3's capabilities for yourself—it's on the DVD.)

"Unreal Engine 3's new renderer is the most visible improvement," says Epic's president and Unreal Engine guru, Tim Sweeney. "The per-pixel lighting and shadowing models are extremely advanced, and all rendering is done with 64-bit color HDR (High Dynamic Range). The characters are rendered with the visible lighting detail of their 2-6 million polygon source meshes, and the shader system is extremely artist-friendly and programmer-extensible."

And just as the original iteration of the Unreal Engine was capable of rendering large outdoor expanses (in relation to what else was on the market at that time), Unreal Engine 3 will continue and expand on that capability and could rival the CryEngine in terms of sheer external rendering power.

### The Details: Unreal Engine 3

**Lines of Code:** 600,000
**Time to Create Engine:** 100,000 hours
**Programmed on:** High-end consumer PC
**Programming Language:** C++, gameplay scripting language
**Size of Team:** 25
**Hardware Requirements:** Optimal PC for Unreal Engine 3 doesn't exist yet
**Cost of License:** Negotiable

"[The engine's] outdoor environments bring an unprecedented level of realism," explains Sweeney, "with real-time displacement-mapped, normal-mapped, and properly lit and shadowed terrain, and procedural support for vegetation." The latter is a new feature of the Unreal

**These exclusive shots give you a glimpse of Unreal Engine 3's potential to render large outdoor scenes in vivid detail.**

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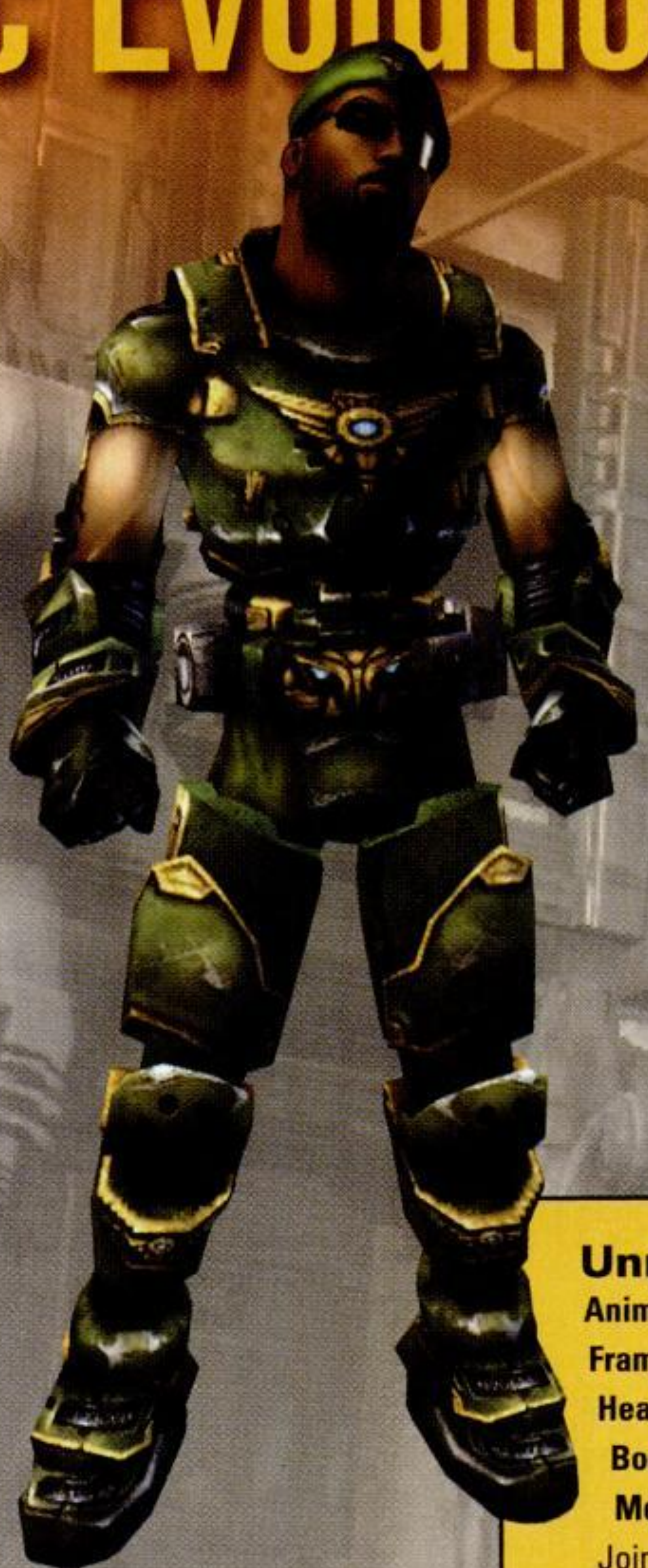
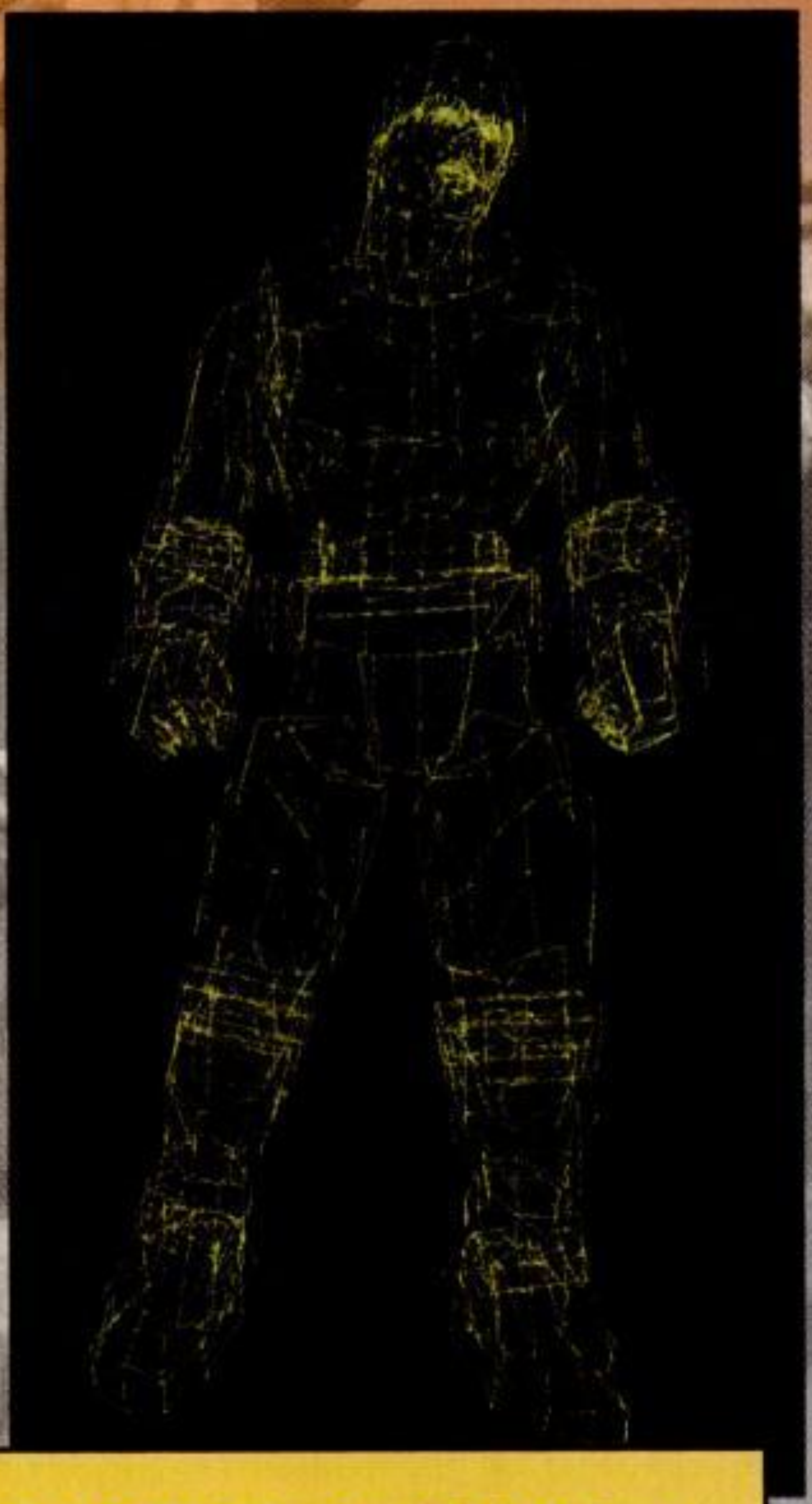
# Unreal's Epic Evolution

**We take a look at how the character Malcolm's technical specs have evolved with each generation of Unreal Engine technology—and at the PC needed to make him look all nice and pretty**





### Unreal Engine 2: Malcolm

**Animations:** 84

**Frames of animation:** 1,607

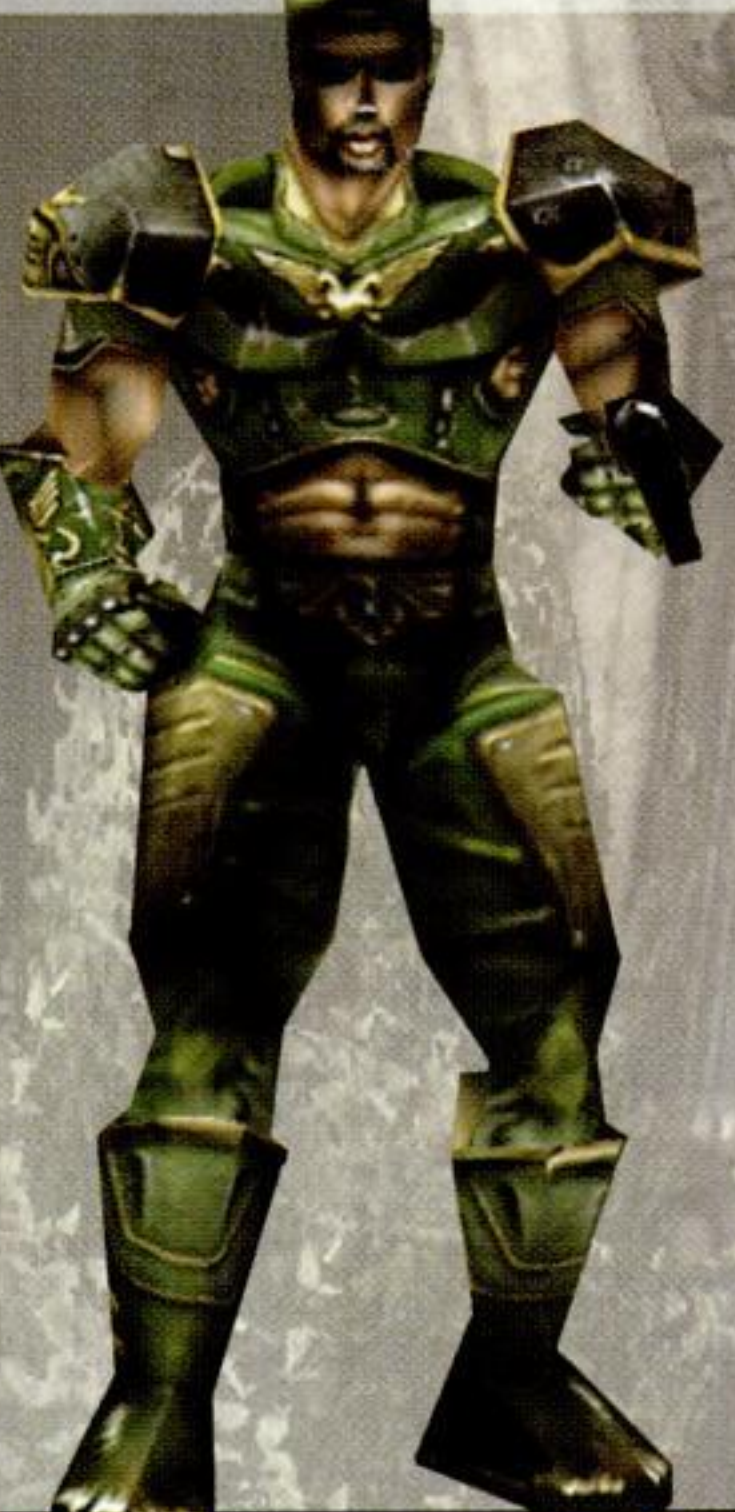
**Head texture resolution:** 1,024 x 1,024

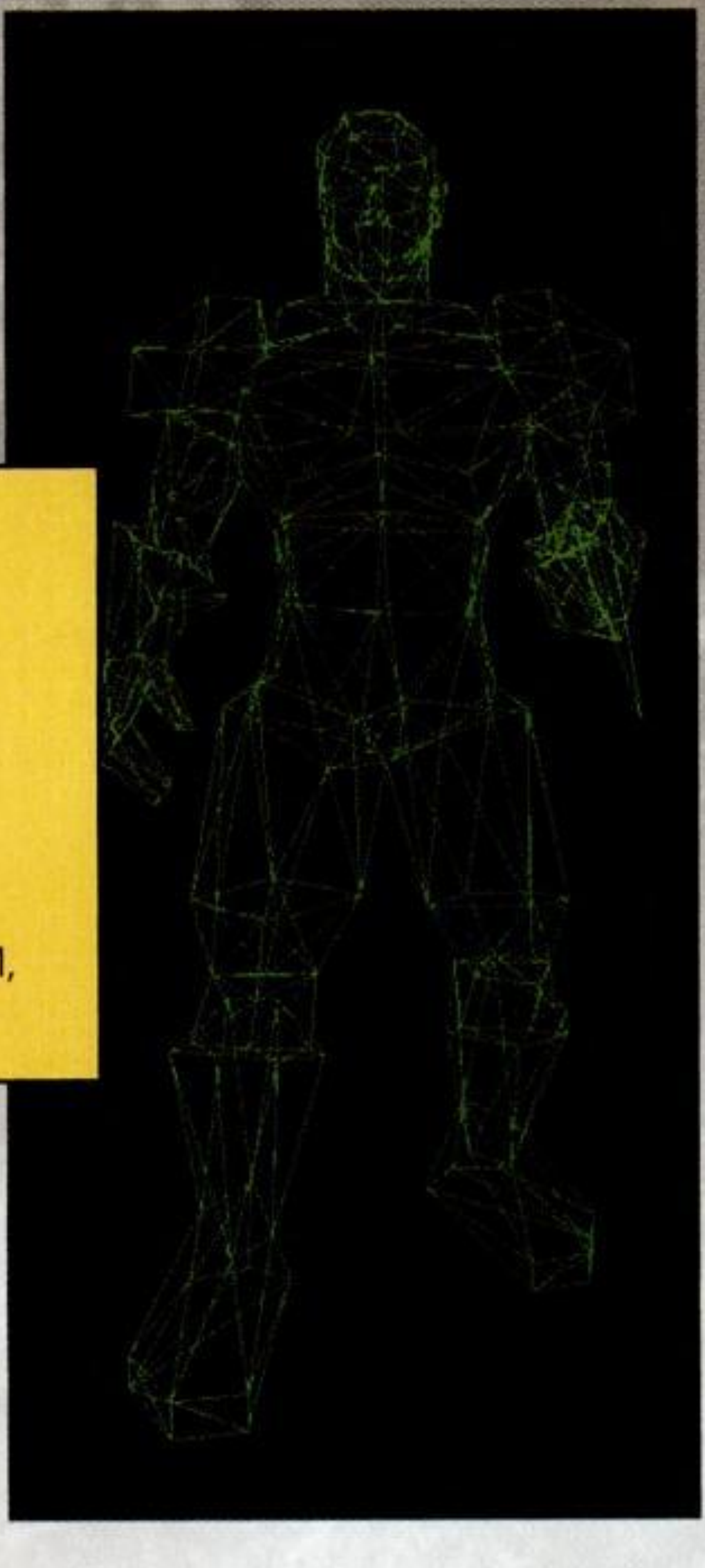
**Body texture resolution:** 1,024 x 1,024

**Mesh Faces in Normal Map:** 3,030

Joints: 26

**PC Required:** 800MHz PIII, 256MB RAM, 32MB video card, 3GB hard drive space





### Unreal Engine 1: Malcolm

**Animations:** 68

**Frames of animation:** 700

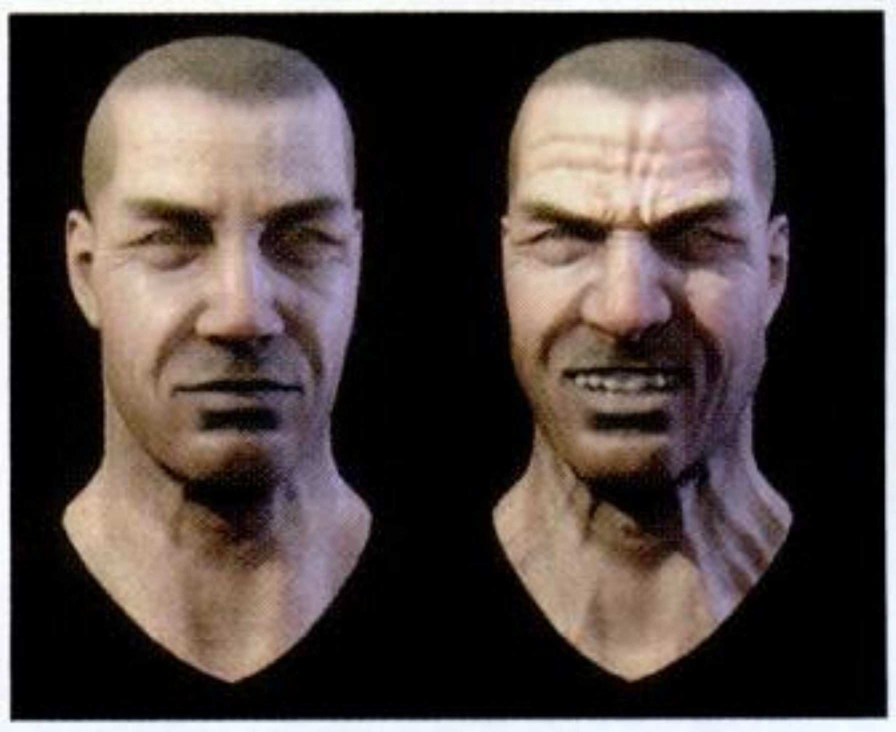
**Head texture resolution:** 256 x 256

**Body texture resolution:** 256 x 256

**Mesh Faces in Normal Map:** 595

**Joints:** 18

**PC Required:** 166MHz Pentium, 32MB RAM, 2MB video RAM, 100MB hard drive space



*Unreal Engine 3's rendering technology enables designers to create characters with complex, animated facial musculature. This should translate into more realistic—and varied—facial expressions for in-game characters, which should give tomorrow's 3D games heighted dramatic impact. It raises what Valve's Source engine does in Half-Life 2 to a whole new level.*

### Unreal Engine 3: Malcolm

**Animations:** 100+

**Frames of animation:** 3,600+

**Head resolution:** 2,048 x 2,048

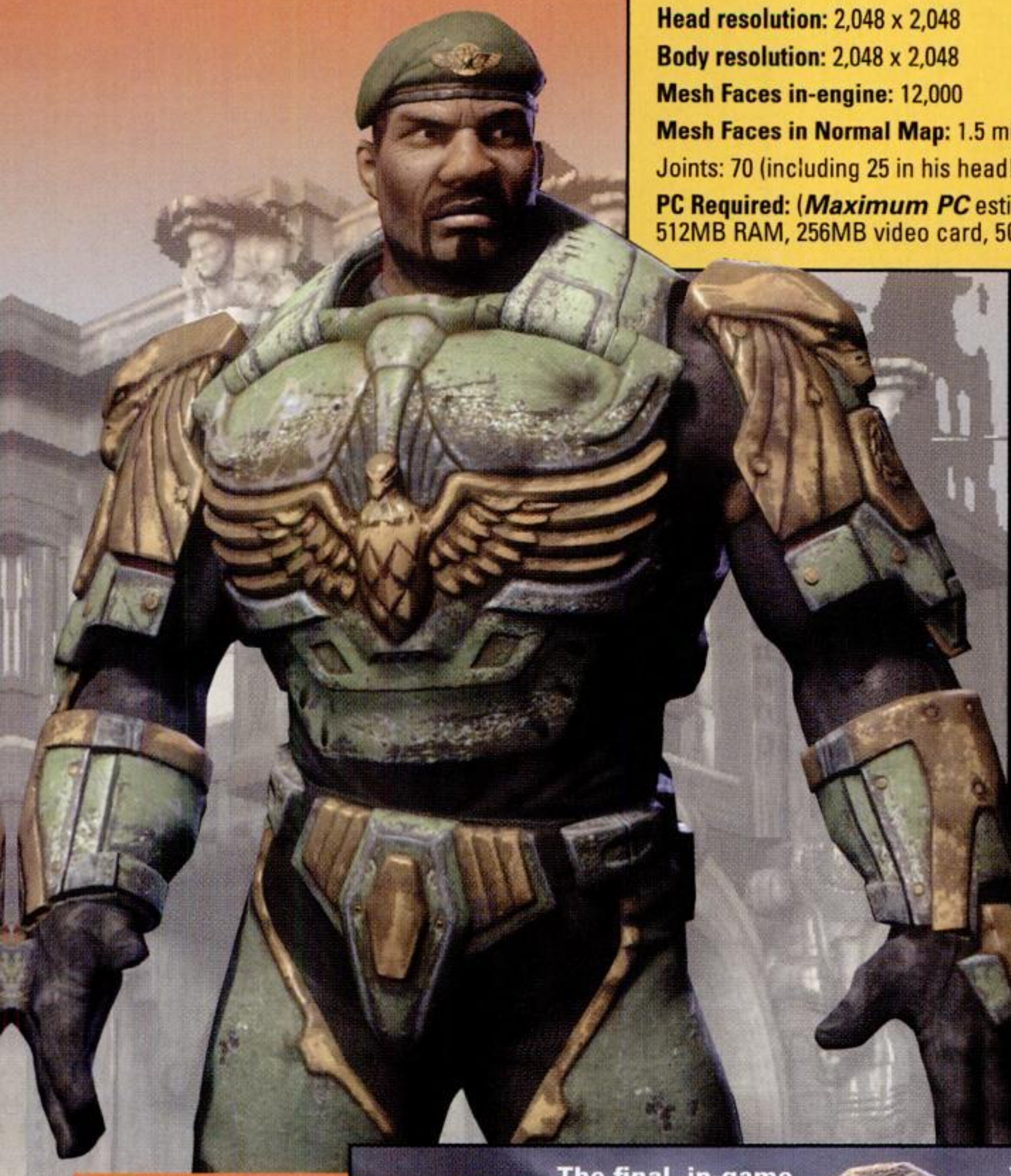
**Body resolution:** 2,048 x 2,048

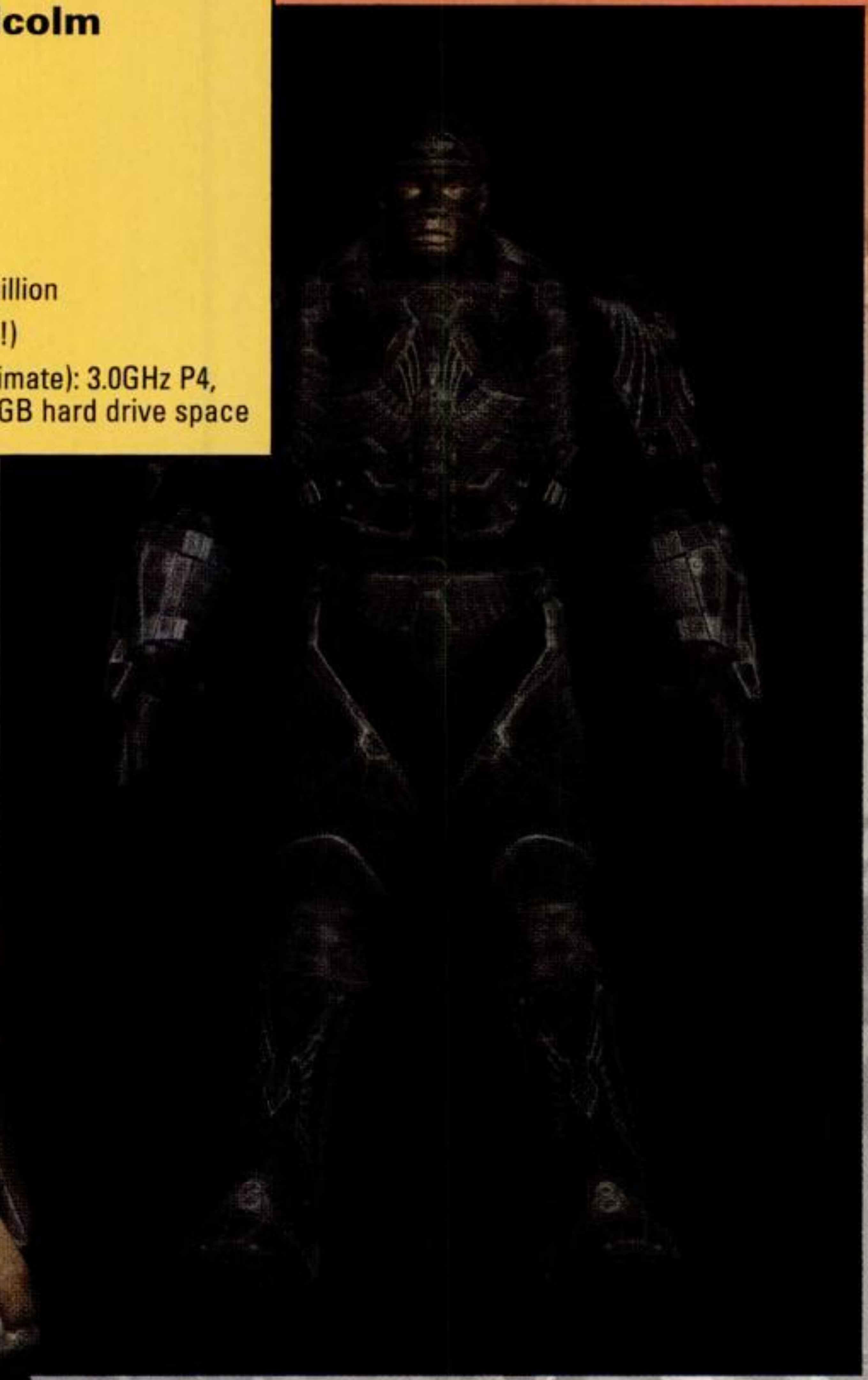
**Mesh Faces in-engine:** 12,000

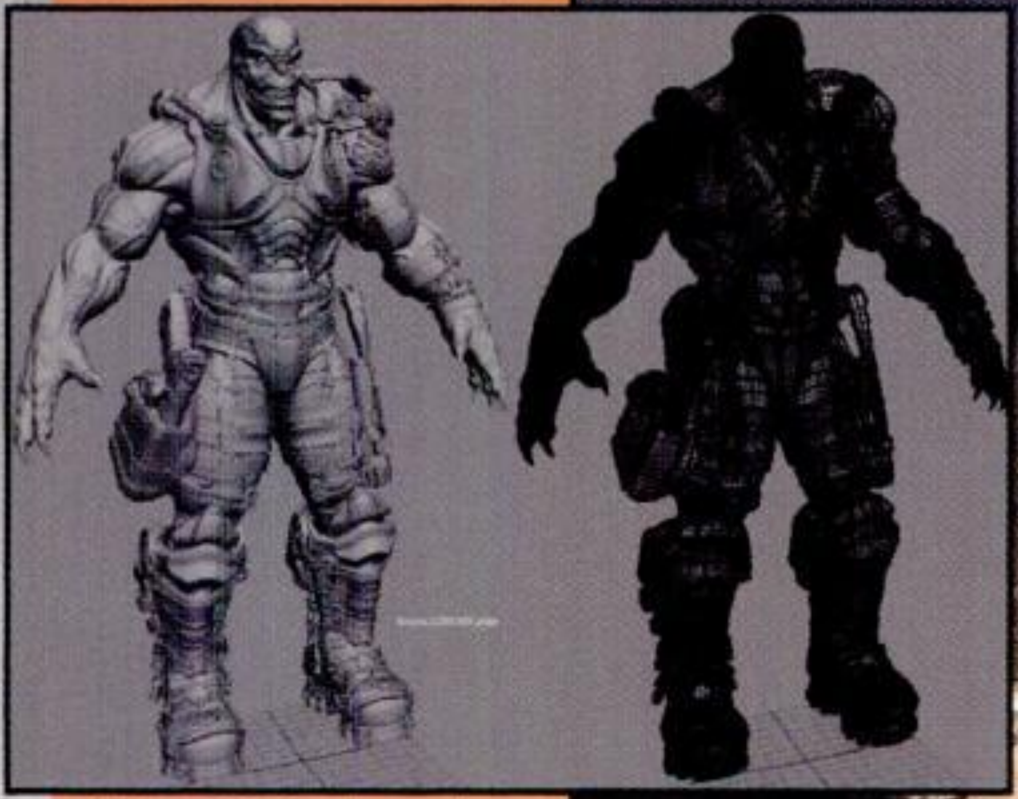
**Mesh Faces in Normal Map:** 1.5 million

Joints: 70 (including 25 in his head!)

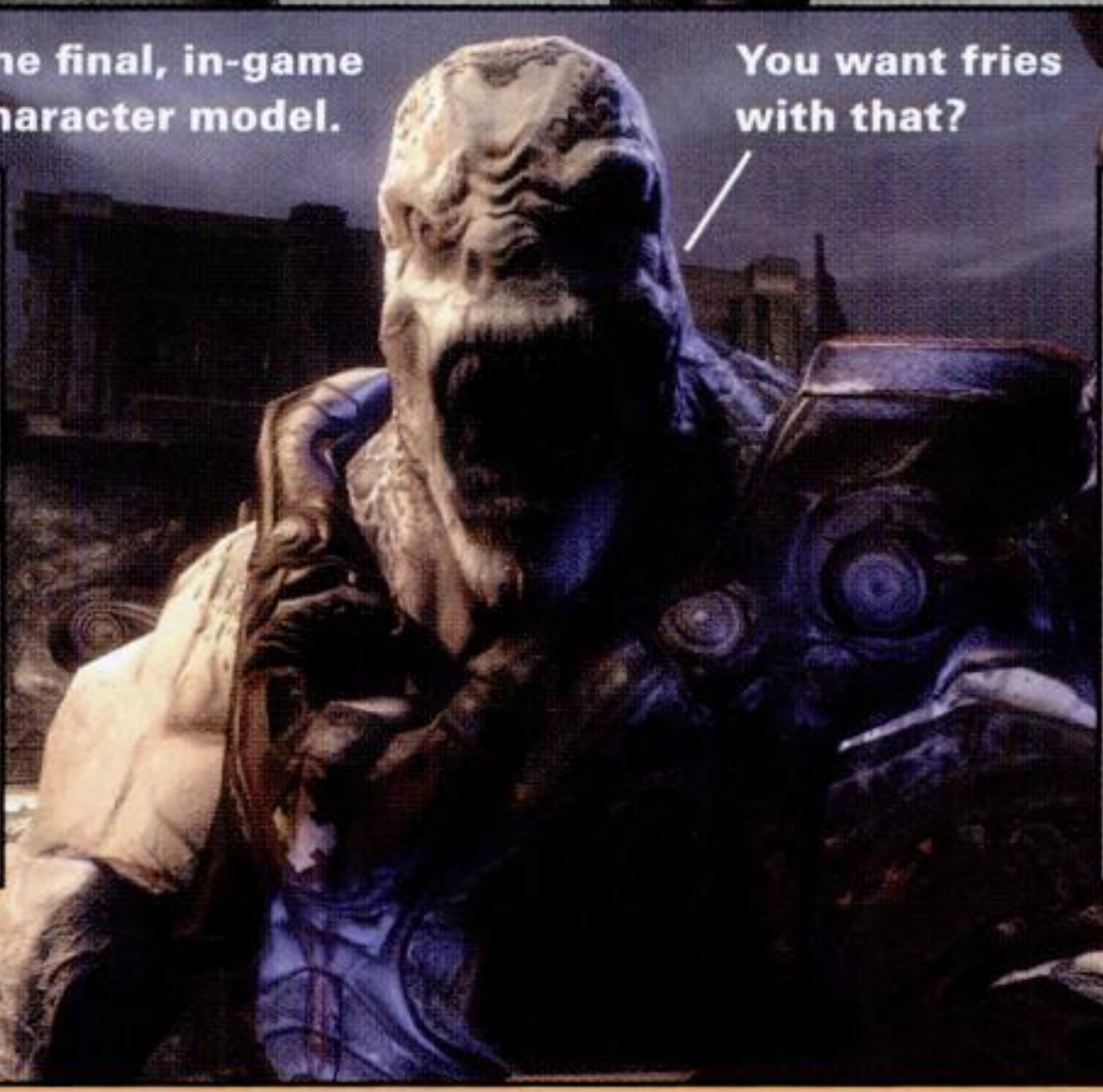
**PC Required:** (***Maximum PC*** estimate): 3.0GHz P4, 512MB RAM, 256MB video card, 5GB hard drive space





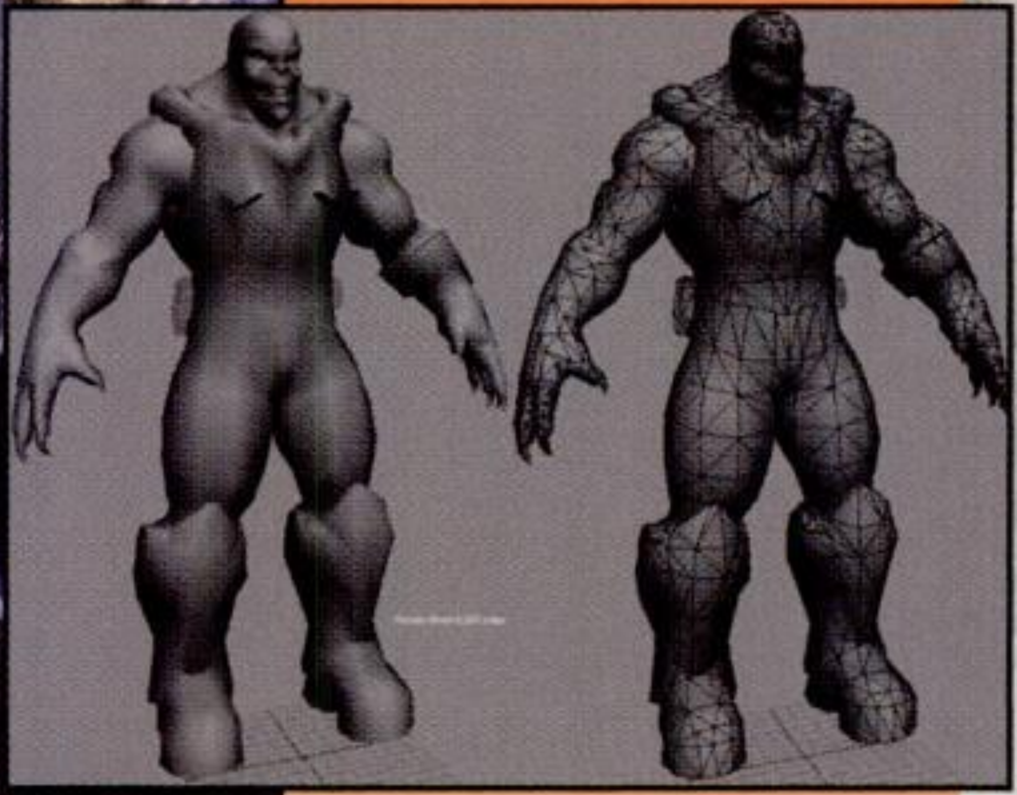


**A 5,287-triangle in-game mesh in 3D Studio Max.**



**The final, in-game character model.**

**You want fries with that?**

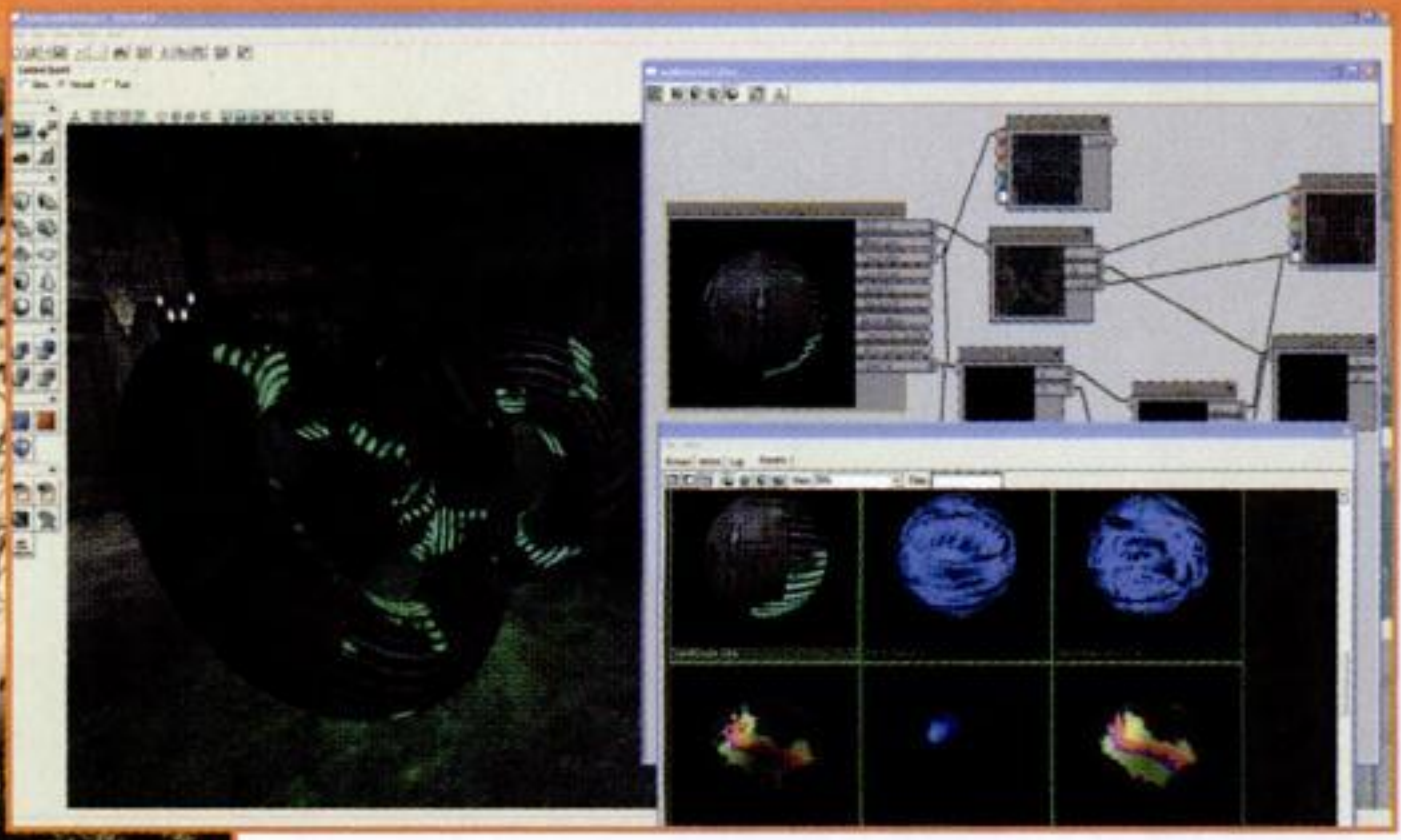


**A 2,000,000-triangle detail mesh in 3D Studio Max.**

## How Unreal 3 Characters Are Generated

Following is a general description of how the characters in the next Unreal 3-powered game from Epic—for which specific information remains under lock and key—will be created. For more Unreal 3 details go to **www.unrealtechnology.com**.

For most characters, Epic builds two versions of their geometry in 3D Studio Max: a renderable mesh, and a detail mesh containing only geometry. The two meshes are then passed through the Unreal Engine 3 preprocessing tool, which raytraces the detail mesh and, from its high-polygon geometry, generates a high-resolution normal map that is applied to the real-time mesh when rendering. In a nutshell, this process enables the in-game characters to be rendered in real-time inside a game and look nearly as good as their high-polygon-count originals.



**Unreal 3's new extensible materials system, which lets artists and programmers quickly create sophisticated objects, hard at work.**

**This Unreal 3-powered flying beast looks hungry—and you look like dinner! Check out the translucent wings and detailed veins.**

engine, which goes through and realistically generates vegetation based on the conditions of the terrain, such as altitude.

### Keeping What Works

Unlike other major 3D engines on the market (with the exception of Gamebryo), newer versions of the *Unreal* engine aren't built from the ground up; instead, they're built off of the foundation from the original *Unreal* engine. Specifically, Sweeney says that there is a core group of engine components—such as the gameplay networking interface, file management, and scripting interface—that have needed only enhancement, not replacement as each new generation of technology is implemented. That said, Sweeney tells us that code from Unreal Engine 1 is definitely in the minority in terms of Unreal Engine 3.

"The basic architectural decisions visible to programmers," he says, "of an object-oriented design, a data-driven scripting approach, and a fairly modular approach to subsystems still remain [from Unreal Engine 1]. But the parts of the game that are really visible to gamers—the renderer, the physics system, the sound system, and the tools—are all visibly new and dramatically more powerful."

And those parts of the engine have been dramatically improved in Unreal Engine 3. The new renderer is completely focused on DirectX 9 (DX 7/8 support was built into Unreal Engine 2), and this means that Sweeney and his merry band of programmers have created an extensible material system, which lets artists create complex materials—in a 100% visual user-interface—by combining simple building blocks (such as texture maps, alpha blenders, and other color-blending units). Programmers can easily add new building blocks that artists can then combine with existing ones to quickly create sophisticated objects and effects.

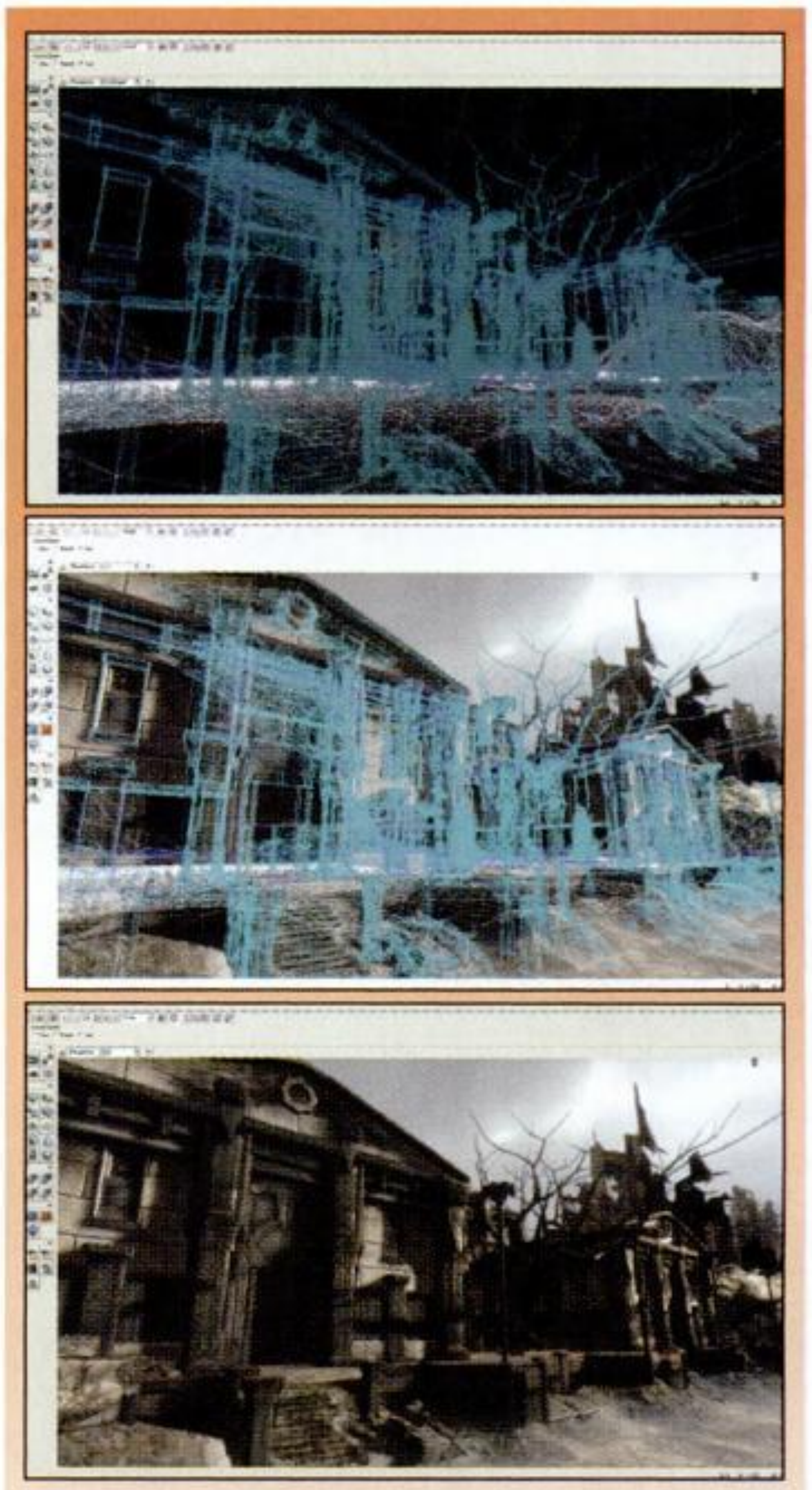
In terms of the engine's physics, Epic is using NovodeX, a new physics engine that promises some brilliant innovations. Light will now penetrate objects (as opposed to simply bouncing off of them), and will actually create "friction" between various joints in a model's body, meaning that when the model's shot or impacted, it will behave in an utterly realistic way. (As opposed to the often goofy "rag doll" effects that we currently have.)

### Make Something Unreal

Plenty of companies have supported mod developers (Valve, for instance, purchased *Counter-Strike*, *Day of Defeat*, and *Team Fortress* from their creators), but Epic has taken mod support to an entirely new level with its Make Something Unreal contest.

The contest, which is co-sponsored by Nvidia, is entering its third phase at the time of this writing, and some truly stunning mods have been created, all vying for the $1 million in prizes.

Although the Make Something Unreal contest will be over long before any games using the third iteration of the



**Here we see a level scene in the Unreal 3 editor progress from mere wireframe to final textured masterpiece.**

## Unreal Engine 3 Vital Ingredients

**Rendering System:** The gamma-correct, linear-color, space renderer provides for immaculate color precision, and it supports a wide range of post-processing effects. These include light blooms, lenticular halos, and depth-of-field. Support for all modern per-pixel lighting and rendering techniques, including normal-mapped, parameterized Phong lighting; virtual displacement mapping; light attenuation functions; pre-computed shadow masks; and pre-computed, bump-granularity self-shadowing using spherical harmonic maps. Whew!

**Physics System:** Rigid body physics system supporting player interaction with physical game objects, rag-doll character animation, complex vehicles, and "dismemberable" objects. All rendered materials have physical properties such as friction. Fully integrated support for physics-based vehicles, including player control, AI, and networking.

**AI:** Pathfinding framework with full awareness of common game objects such as triggers, doors, and elevators, allowing for complex navigation scenarios where an NPC will press switches, open doors, and navigate around temporary obstructions to reach its destination.

Unreal engine are released (the soonest we can expect to see those games is 2006), Sweeney assures us that Unreal Engine 3 will continue to support Epic's long-standing belief that the Unreal engine should be completely modable.

"[It] improves modability in many ways, by making many of the key systems modular," Sweeney describes. "For example, mod makers can now create extremely elaborate material shaders using UnrealEd's new visual shader editor. And there is a completely new graphical gameplay scripting tool, and physics setup and configuration is now extremely accessible and user-friendly."

There's no question that the Unreal technology is here to stay and that it has positioned itself as one of the premier pieces of 3D software in the world—Unreal Engine 3 may be the iteration that firmly entrenches Epic as the leader of the pack. While the first two generations of Unreal technology have lagged behind id's offerings, Unreal Engine 3 is poised to finally leap-frog the current status quo and raise the 3D bar. We can't wait to see what both game developers and mod makers come up with using Unreal Engine 3, which should be in early 2006.

## Titan 2.0: The RTS Engine That Could

Although most 3D engines are designed with first-person shooters in mind (or like Gamebryo, which can handle a multitude of genres), the Titan 2.0 engine was designed from the ground-up specifically for RTS and city-building games.

Developed by Stainless Steel Studios for use in the games *Empire Earth* and *Empires: Dawn of the Modern World*, Titan 2.0 is packed with all of the features that you'd expect from a next-generation 3D engine, including physics, a particle system, and a tiered AI engine that lets developers manipulate a wide range of unit behaviors. That said, creating an engine for an RTS game is quite different from crafting one for a FPS.

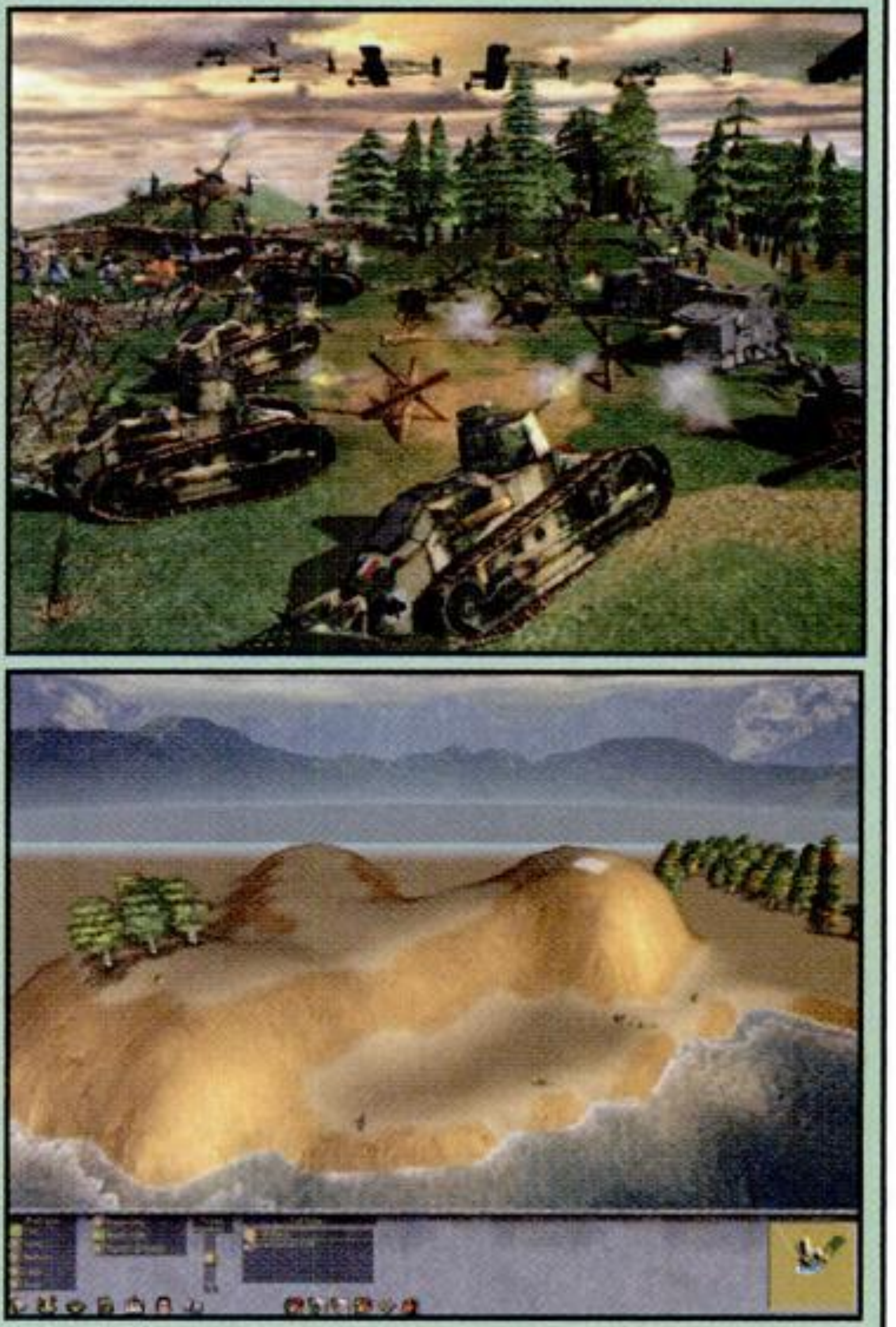
"RTS games typically have lower system requirements than FPS games," explains Greg Seegert, the lead graphics programmer at Stainless Steel. "RTS games may appeal to a broader market, and thus a lot of time will need to be spent on compatibility testing. The worst scenario is when a great new graphics feature is introduced, but it does not work on a low-end graphics card. The feature is often merely disabled, but what about the case where the feature is critical to the appearance of the game?

"For example, on *Empires* we had approximately four different code paths just to render 'player' or 'team' color on units due to compatibility, performance, and memory concerns. For our next engine, I recently spent an entire day trying to create realistic water that matched the quality I was able to achieve using Pixel Shader 2.0—without being able to use pixel shaders at all."

Of course, 3D engines for RTS games also have a hefty requirement that FPS shooter engines don't have to address—the ability to render hundreds of units onscreen at once.

"Some programming techniques that are possible with five units on the screen are just not feasible given 200 units on the screen," explains Shawn Shoemaker, assistant lead programmer. "It's even more of a challenge to get thousands of units operating independently on a minimum computer system."

Adding to the Titan 2.0 engine's status as a top RTS engine is the fact that it contains a database that controls over 200 attributes associated with every object in the game world. Just imagine trying to update all of that information on an individual basis by hand!



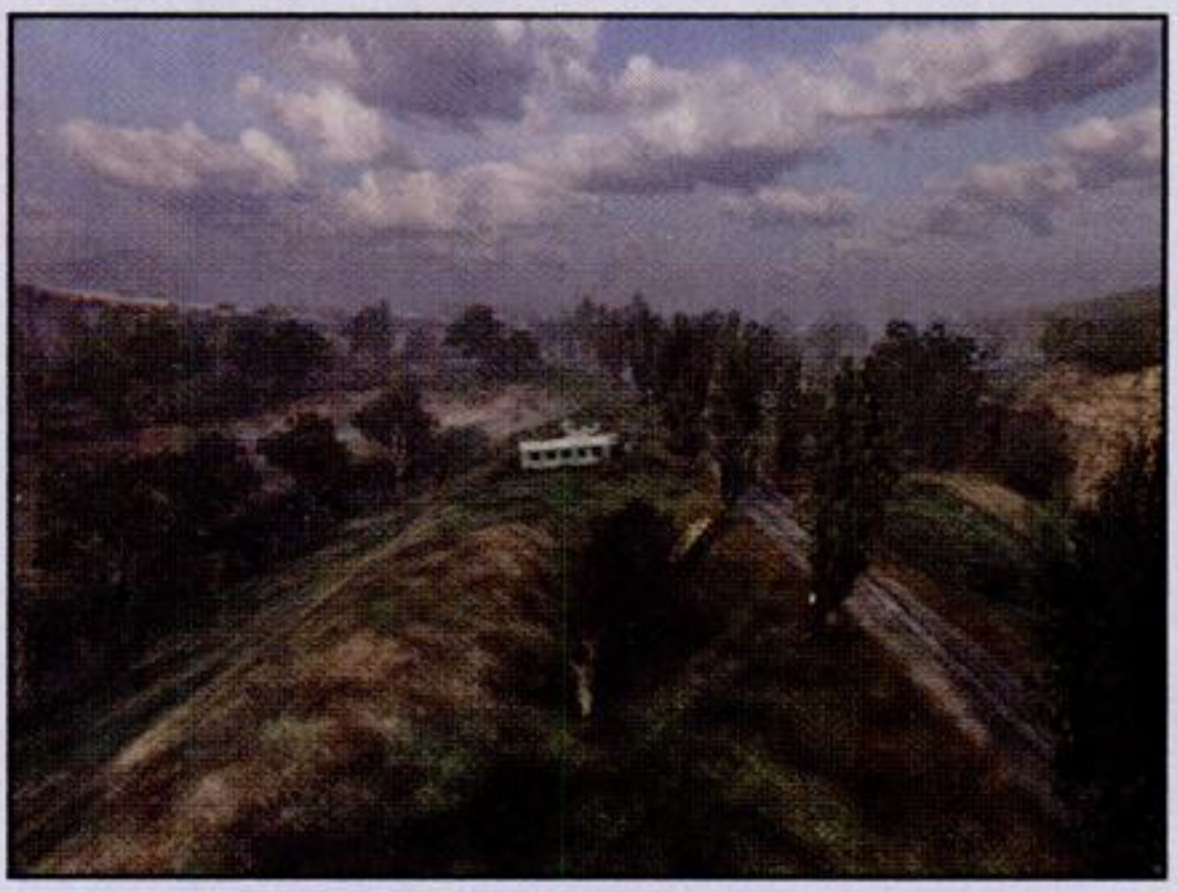
**From humble 3D beginnings grow big RTS results in the Titan 2.0 engine.**

## STALKER's X-Ray Engine—3D Darkhorse?

Under development by GSC Gameworld (and set to be published by THQ), *STALKER* is a first-person shooter set in the nuclear wastelands around Russia's Chernobyl nuclear power plant. Mercenaries, called Stalkers, enter the area in search of various "artifacts" that will fetch a hefty sum on the black market. Unfortunately, the area is teeming with mutants intent on munching on the Stalkers.

In addition to the fairly original story behind *STALKER*, the game is using a new 3D engine called X-Ray to deliver its visuals, physics, and AI. We've seen *STALKER* in action a couple of times, and when all of the DirectX 9-supported features are turned on, it is quite stunning. The X-Ray engine is capable of rendering large environments complete with wind and turbulence. And the plant life, be it the grass or trees, looks extremely realistic. There are some nice effects like enemies turning "invisible" (yet you can still see their tracks), and the lighting looks like it's going to challenge that in the Doom 3 engine.

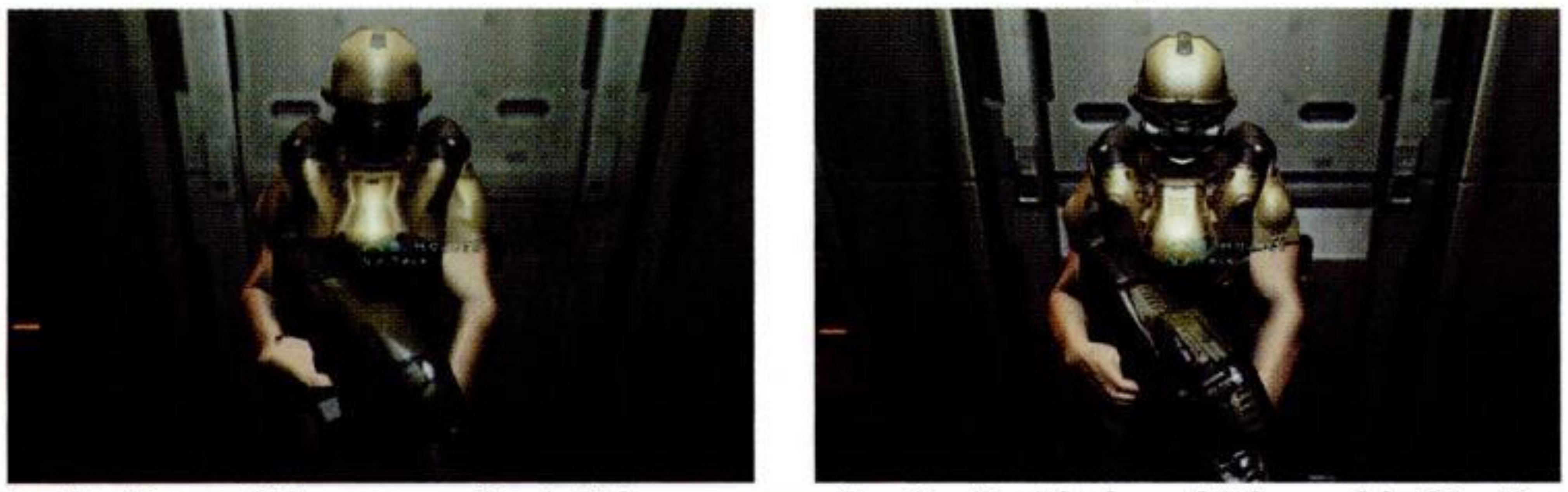
That said, *STALKER* has been delayed a few times, so we're hoping that the delays have more to do with localizing a game developed in Eastern Europe and less to do with wrangling the tech into a manageable form. We'll be keeping a close eye on this dark horse, and you should, too.



***STALKER* aims to rival *Far Cry* in the "look how big of an outdoor scene we can create in our engine" contest.**

# Glossary of Fancy 3D Terms

## Million-dollar technical terms explained in detail



**In the *Doom 3* image on the left bump-mapping is disabled, and it's enabled in the image on the right. Note how the image on the right gains considerable 3D detail.**

**Bump-Mapping:** Adds 3D details to models/textures by using gray-scale lighting.

**Normal-Mapping:** Similar to bump-mapping, normal-mapping encodes both the height of a pixel and the direction a pixel faces in a normal bitmap (standard bump maps just encode the height). Using this normal map, a 3D engine can add detail to a low-poly model.

**Character Inverse Kinematics:** Inverse Kinematics are used to displace joints of a bone-structure correctly on irregular topology, such as a character's foot on a rock or rough ground. It's a technique used to ensure that a foot is placed correctly on the ground at any time.

**Diffused Specular Bump-Mapping:** Specular bump-mapping is used to render things that are shiny and bumpy (metallic or wet bumpy surfaces), and diffused bump-mapping is used to render rough bumped surfaces, and the effect will be most obvious in *Half-Life 2* when using the flashlight.

**Pixel Shading:** Creates the surface detail on characters and objects. Semi-translucent skin, shiny and reflective surfaces, and irregular surfaces (like leather texture) are examples of the kinds of effects that developers can create using pixel shaders to create.

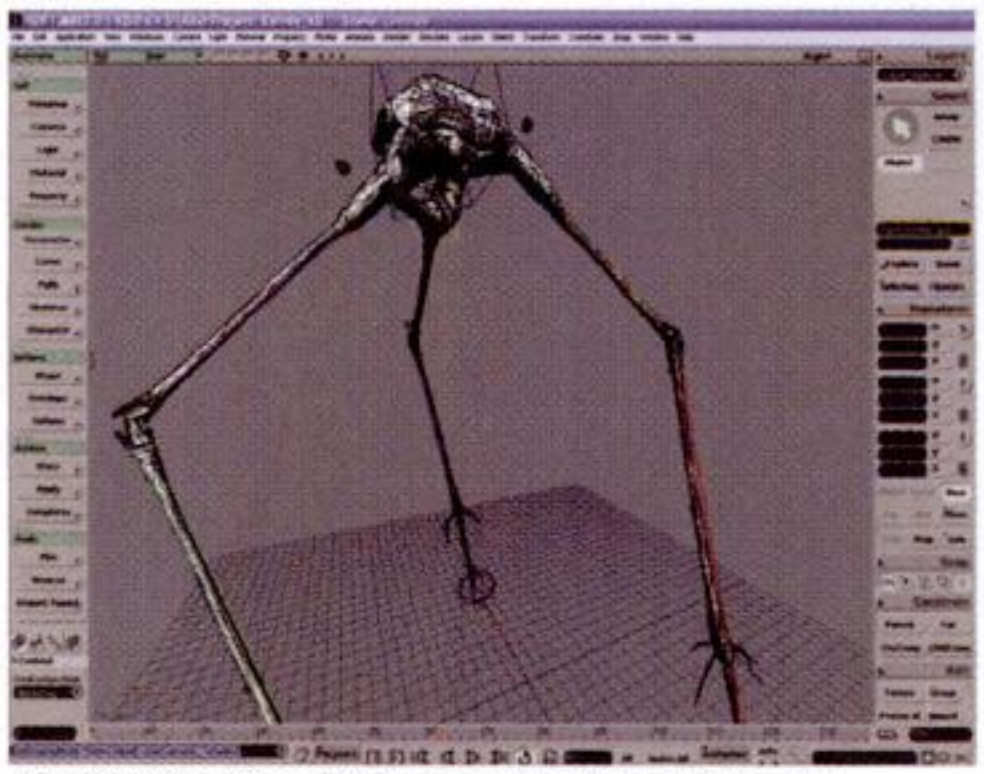
**Vertex Lighting:** Determines how much light from a light source is reflected on an object or character in the gameworld. This creates realistic lighting and shading effects, as light will fade the further you get away from a light source.

**Vertex Shaders:** Allows developers to create visual effects such as realistically waving grass, dynamically animated hair, and deformable terrain.

**Refraction and Fresnel Effects:** Some games accurately model the refraction of light when it moves from air to another substance—like water. Refraction makes items appear to bend when they're inserted into water. Fresnel effects work much the same, but they control how shiny materials, like metal, reflect light.

**Parallax Mapping:** Simulates the parallax effect you see in real-world materials that have depth variation (such as bricks with mortar, stone walls, etc.).

**Kinematic Animated Bone Followers:** This is the technique Valve uses for the Strider's legs. Inverse kinematics determine the Strider's leg placement based on where he wants to step on the ground, and "bone followers" is a technique used to attach a collision representation to his legs while he's walking around.



***Half life 2*'s Strider wouldn't look nearly as cool without its snazzy kinematic animated bone followers.**

**High Dynamic Range:** With a High Dynamic Range (HDR) renderer, it is possible to simulate the range of "brightnesses" seen in the real world, such as the contrast between a deep, dark shadow and a sunlit metal roof. HDR is typically also used in conjunction with effects such as light blooms and lenticular halos, which simulate the kinds of spherical and optical patterns you see around bright lights in nighttime scenes. (Note: This term, and many others in this article, are explained visually in the *Unreal Engine 3* movie on the DVD. Watch it!)

**Extensible Material System:** Artists can create arbitrarily complex materials in a 100% visual user-interface by combining simple building blocks (such as physical effects, texture maps, alpha blenders, and other color-blending units that are familiar from Photoshop and Maya). Programmers can easily add new building blocks that artists can then combine with existing ones.

**Parameterized Phong Lighting:** Phong lighting is a type of per-pixel lighting. This means that you get a reasonable approximation of the right amount of light to be used for every pixel rendered. It simulates diffuse and reflective surfaces by making some clever approximations to simulate the effect of realistically lighting geometry.

**Virtual Displacement Mapping:** Synonymous with Parallax Mapping, this is a fast texture-mapping technique that simulates the parallax effect you see in real-world materials that have depth variation (such as bricks with mortar, stone walls, etc).

**This demo shot from Valve's Source engine shows how light attenuation functions are used to simulate the way light casts through stained glass and falling water.**

**Light Attenuation Functions:** A light attenuation function controls the shape and falloff of a light source. An artist can use this feature to simulate lighting effects like spotlights, light casting through stained glass, or a disco ball effect.

**Pre-computed Shadow Masks:** A technique the Unreal Engine 3 uses to pre-compute the shadowing caused by unmoving lights casting onto moving objects. By computing the shadowing offline (when the content is being built by a developer, rather than in real time on a user's machine), the quality of the effect and performance of the game can be improved.

**Pre-computed, Bump-Granularity Self-Shadowing Using Spherical Harmonic Maps (egad!):** This is a million-dollar term for describing a texture-mapping technique that efficiently simulates the effect of self-shadowing of geometry.

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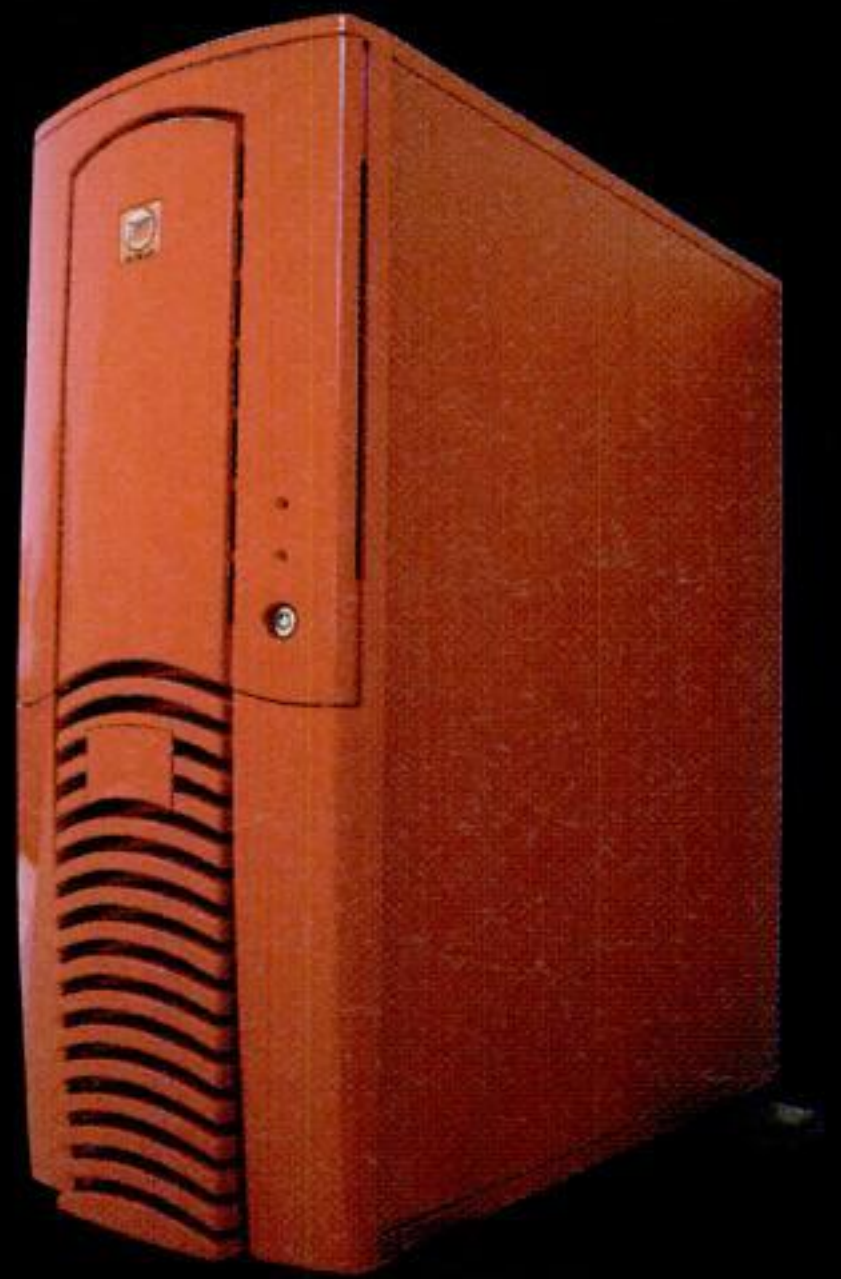

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uly
ugust
une
ptember
Comrade! I can't get a clear shot at those machine gunners up there! I need you to draw their fire for me! You see that truck over there? Wait for them to reload, then run for it and don't stop! On my signal - ready
World War II

# Review

## Itchin' for a new 3D game but unsure of where to spend your hard-earned cash? This catalog of every 3D game reviewed in *Maximum PC* this year will give you the guidance you seek!

There may not be as many games being released these days, but the bar for quality has certainly been raised for just about each and every title that crawls onto the shelves. For evidence, we need look no further than the impressive catalog of reviews that has run in *Maximum PC* in calendar year 2004, which we've put together for you here.

While there may be a few bombs in the mix—*True Crime: Streets of L.A.*, for example—the number of 8's and 9's doled out by the tough-to-please *Maximum PC* staff is worthy of note. Publishers may finally be getting the message that quality sells....

It's a very good time to be a gamer—more specifically, a 3D gamer. If you've got a reasonably hot PC (think at least 2GHz, 512MB RAM, and an ATI 9800 or Nvidia 5900-class video card), you should have little trouble finding plenty of extremely entertaining, and visually stunning, games to keep it occupied.

Elevating us out of the summer doldrums, *Doom 3* is finally here, and it is good—see our review on page 87. *Far Cry* made our Spring. *Call of Duty* and *Knights of the Old Republic*, our Winter. (*Half-life 2* should be here by the time you read this, too, and hopefully it will make our Fall.) As our preview story shows, this holiday season has the potential to be a banner one—perhaps the strongest yet. The competition for Game of the Year is heating up, and choosing one is going to be extremely tough—but we'll worry about that later.

For now, we'll reflect on what 2004 has brought to our desktops so far. To distinguish them from the crowd, titles that deliver the gameplay goods and/or push the 3D envelope receive spotlight coverage. And every game gets an additional rating—cool, warm, hot, or smokin'—to reflect the degree to which it leverages 3D technology to enhance your gaming experience.

Of course, a game that gets a "smokin' " rating will push a high-end PC's resources to their limits, and a game with a "cool" rating should run like butter on the typical specs noted above. So keep your machine's 3D prowess, or lack thereof, in mind when deciding which one of these games you want to play next. Though for any game bearing the coveted *Maximum PC* "Kick Ass" logo, you might want to consider upgrading your PC to play it, because it's *that* good.

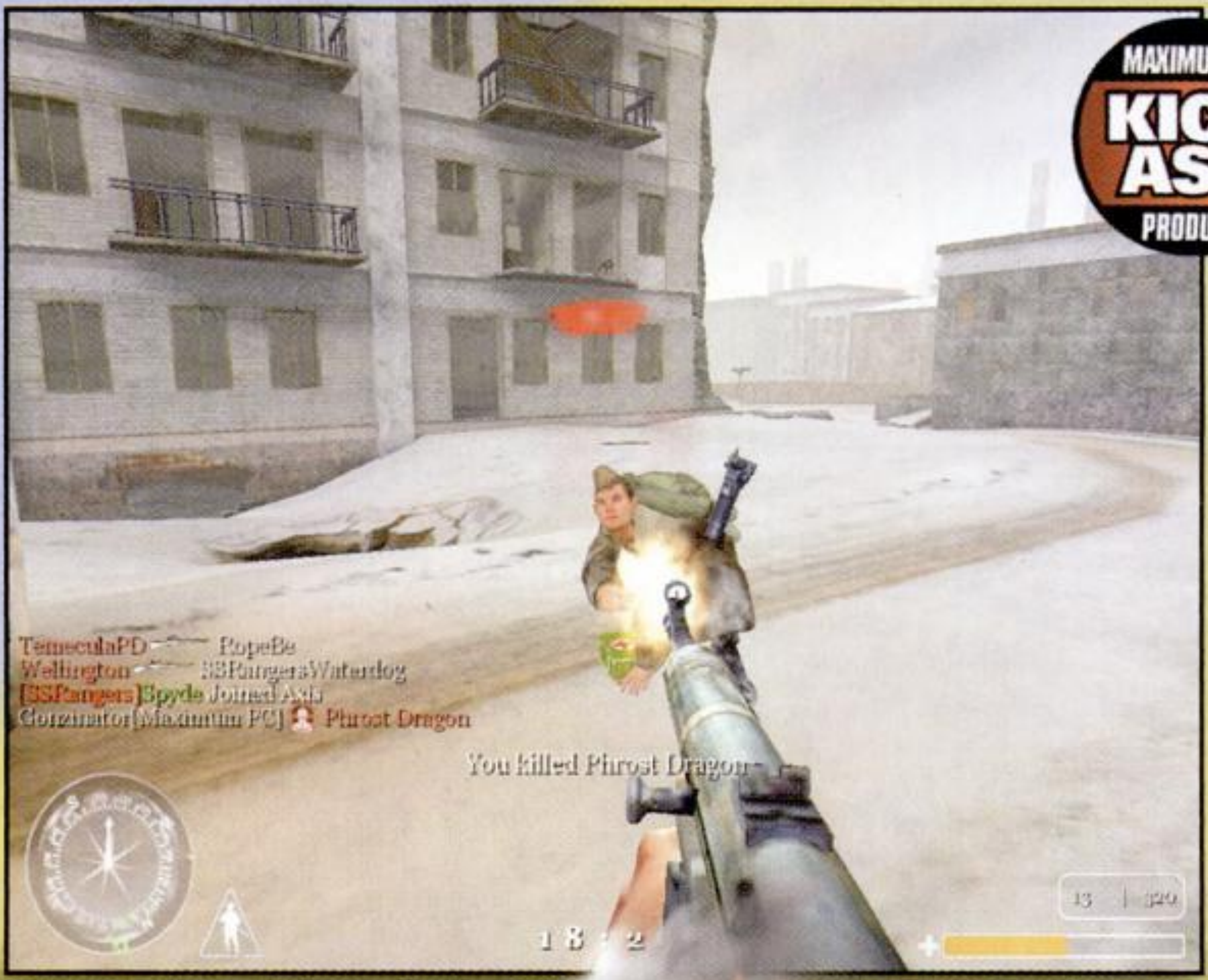
# January

## Call of Duty

**Publisher: Activision, www.callofduty.com**
*Call of Duty* is the ultimate WWII-themed first-person shooter. It excels by teaming you with fellow compatriots in almost every mission of the game's three drastically different settings. We're talking about squad mates that behave intelligently, using cover and grenades to their advantage, laying down suppressing fire to pin an enemy, and—*get this*—actually killing enemies without your assistance. Furthermore, your squad mates' behavior isn't strictly scripted. Each time you replay a mission, your cohorts will respond differently, making for a highly dynamic, realistic experience.

Intelligent use of scripted events throughout the game convincingly draws you into the story while creating the illusion of intense activity outside your immediate vicinity. The first Russian mission epitomizes this approach: Immediately after climbing out of a transport, you'll be shell-shocked by a cavalcade of dive-bombing stukas, handed ammunition but no weapon, and forced into a kamikaze charge up a hill loaded with German machine gun nests. As you progress through the single-player campaign, you'll play as an American G.I., an elite British Airborne unit, and a wet-behind-the-ears Russian conscript. Playing the three campaigns as three completely different soldiers drives home *Call of Duty's* sobering central theme: No one man can turn the tide of war alone.

The slow-paced multiplayer won't appeal to everyone, but the tight controls, multitude of game modes, and well-structured maps will have gamers from the *Counter-Strike* set hootin' and hollerin'. Don't expect any of the vehicular bells and whistles from *Battlefield;* you won't find them here. But you will find well-balanced and powerful weapons that force players to fight as a team... if you want to survive, that is. If you're a shooter aficionado, you must play *Call of Duty.*



TemeculaPD RopeBe
Wellington SSRangersWaterdog
[SSRangers]Spyde Joined Axis
Gonzinator[Maximum PC] Phrost Dragon
You killed Phrost Dragon

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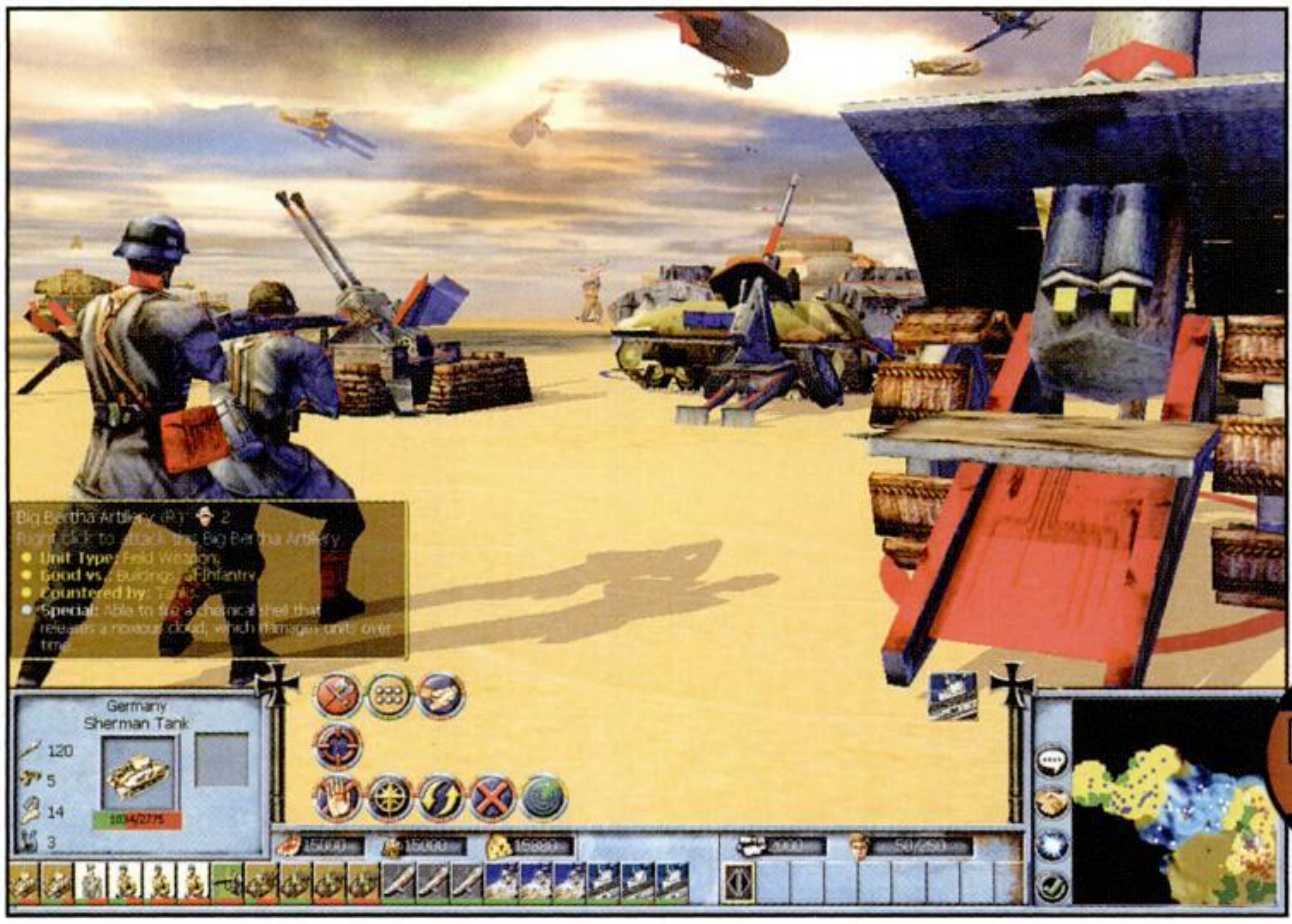
3D Quotient: smokin' Score: 9

## Empires: Dawn of the Modern World



Big Bertha Artillery (R) 2
Unit Type: Field Weapon
Good vs.: Buildings, Infantry
Special: Able to fire a chemical shell that releases a noxious cloud, which damages units over time

**Publisher: Activision, www.empiresrts.com**
From the mind of *Age of Empires* designer Rick Goodman, this fully 3D real-time strategy game looks fantastic and allows you to zoom close in on the action. The beauty isn't skin-deep either, as it also sports some of the deepest historical-based gaming available in the genre.

3D Quotient: hot Score: 9

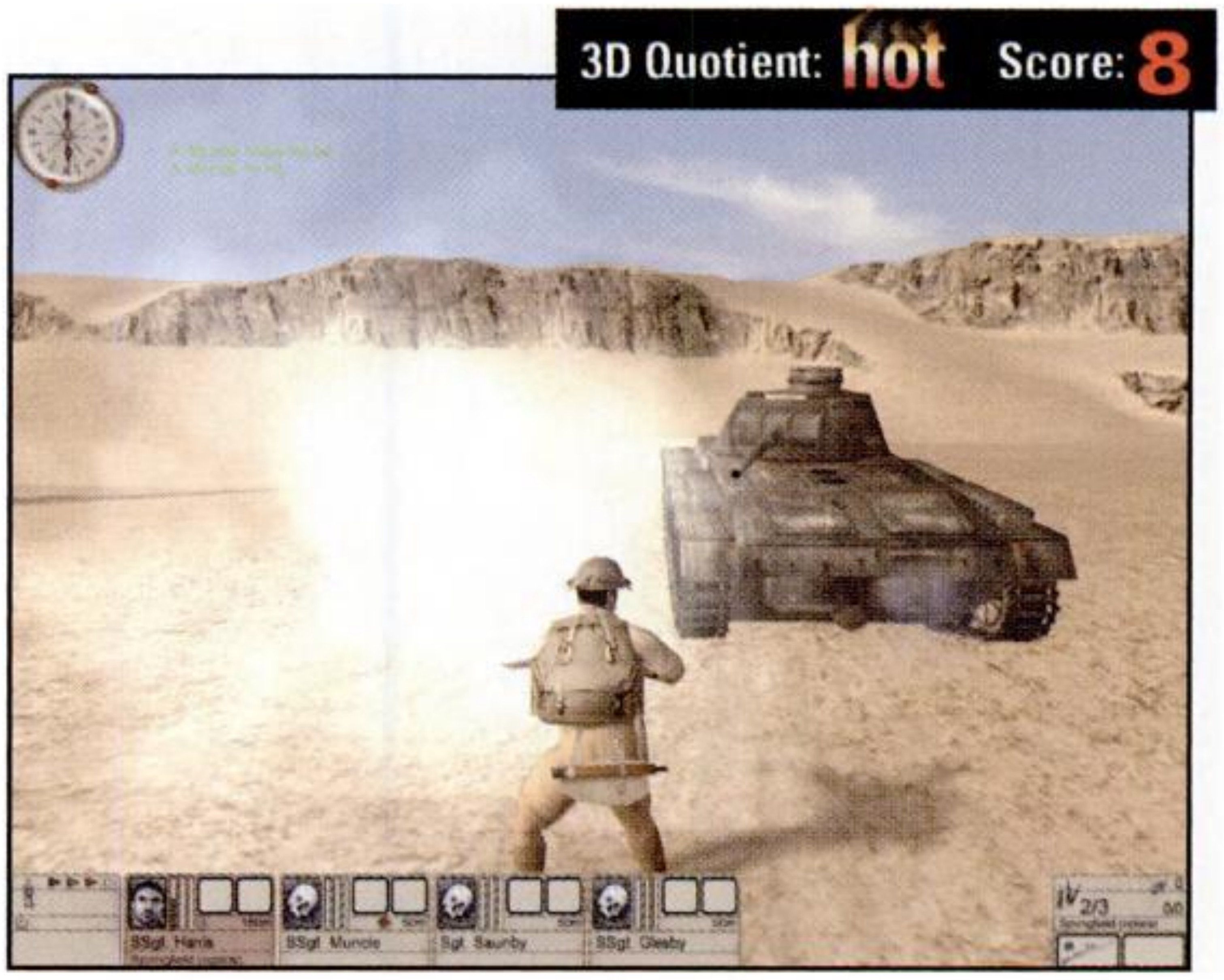
MAXIMUM PC KICK ASS PRODUCT

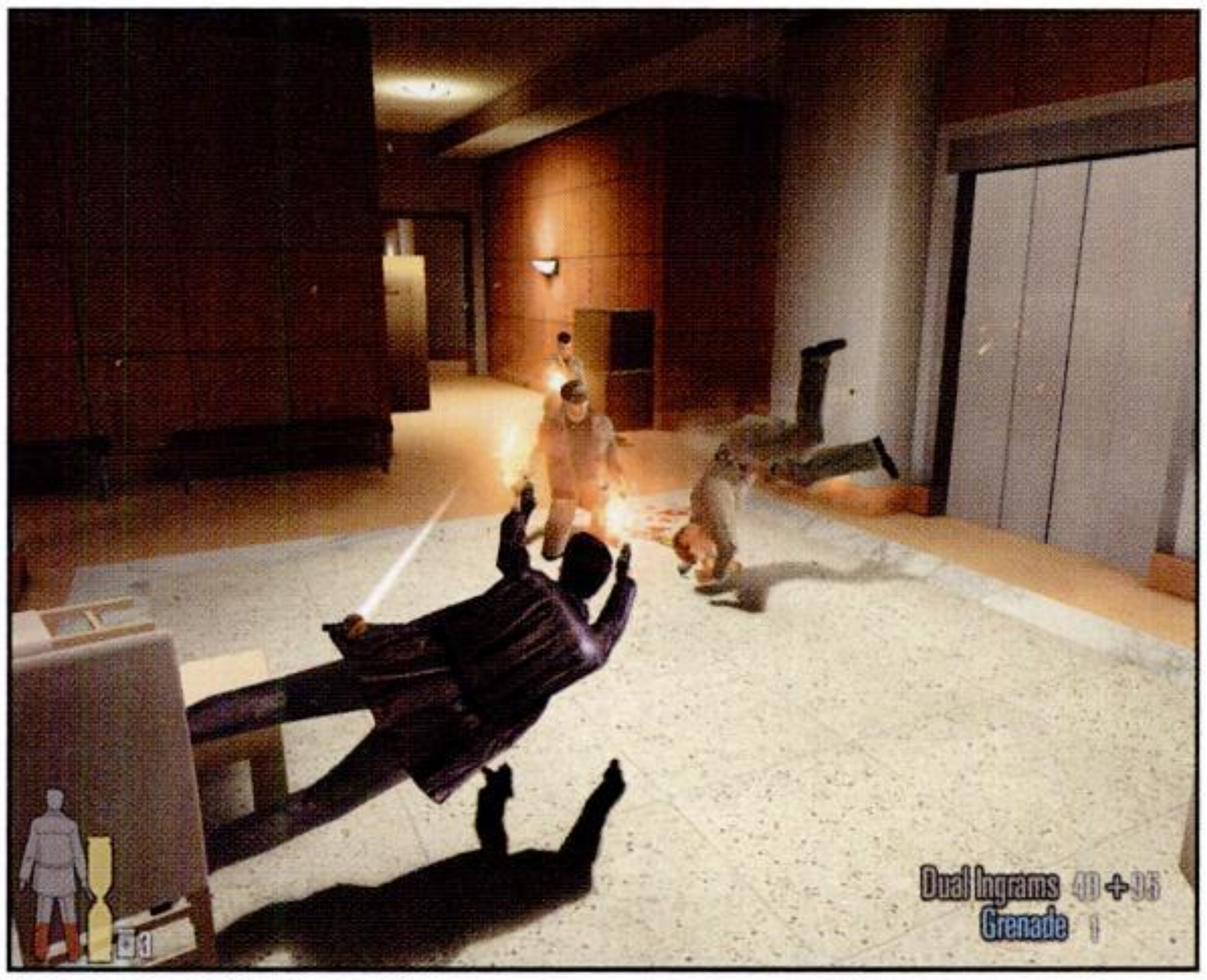
## Hidden and Dangerous 2

**Publisher: The Gathering**
**www.hidden-and-dangerous.com/hd2**

With *Hidden and Dangerous 2,* developer Illusions has served up an entirely new, competitive game engine–capable of rendering very detailed, large, and varied indoor and outdoor environments, as well as very detailed weather effects and nicely animated models–and delivered a suite of disparate missions that is simply thrilling to experience. Like its predecessor, H&D 2 is a "tactical" shooter that puts you in command of an elite team of WWII British Special Air Services (SAS) troops, which are basically highly trained "commando" units tasked with fighting behind enemy lines against tremendous odds. Unfortunately, from a control perspective the game still plays a bit complicated and feels more like a flight sim at times. However, you can configure the controls yourself and the sheer depth of gameplay available here makes this fault easier to overlook. (Note: This review appeared in sister magazine *PC Gamer's* January 2004 issue.)

**3D Quotient: hot Score: 8**





## Max Payne 2: The Fall of Max Payne

**Publisher: Rockstar Games,**
**www.maxpayne2.com**

The gaming equivalent of a fantastic one-nighter, *Max Payne's* ride may be brief, but it's entertaining. Chock full of glorious 3D visuals and pyrotechnic effects, and a gripping, gritty noir-style story, Max's second coming improves on the original's in nearly every facet. However, we beat it in less than 10 hours, so don't look for a long time commitment here.

**3D Quotient: smokin' Score: 8**

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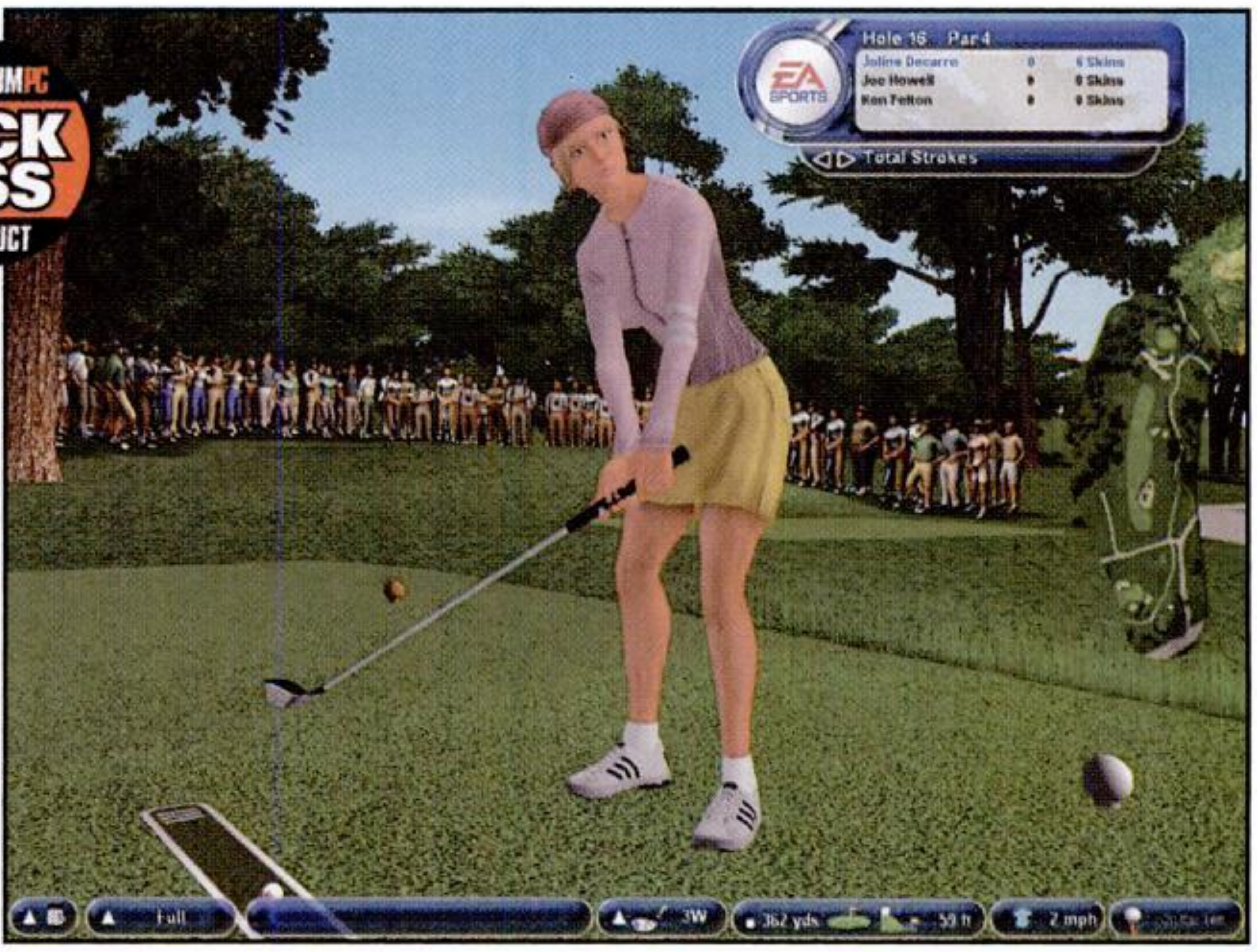
KICK ASS
PRODUCT

## Tiger Woods PGA Tour 2004

**Publisher: EA, www.easports.com**

The closest thing to a "perfect" golf game the PC has ever seen, the latest version of *Tiger Woods* features the largest number of playable courses yet—each one a visual masterpiece. Add a realistic physics engine and new player-customization options to the mix, and this Tiger is untouchable in 2004.

**3D Quotient: warm Score: 9**



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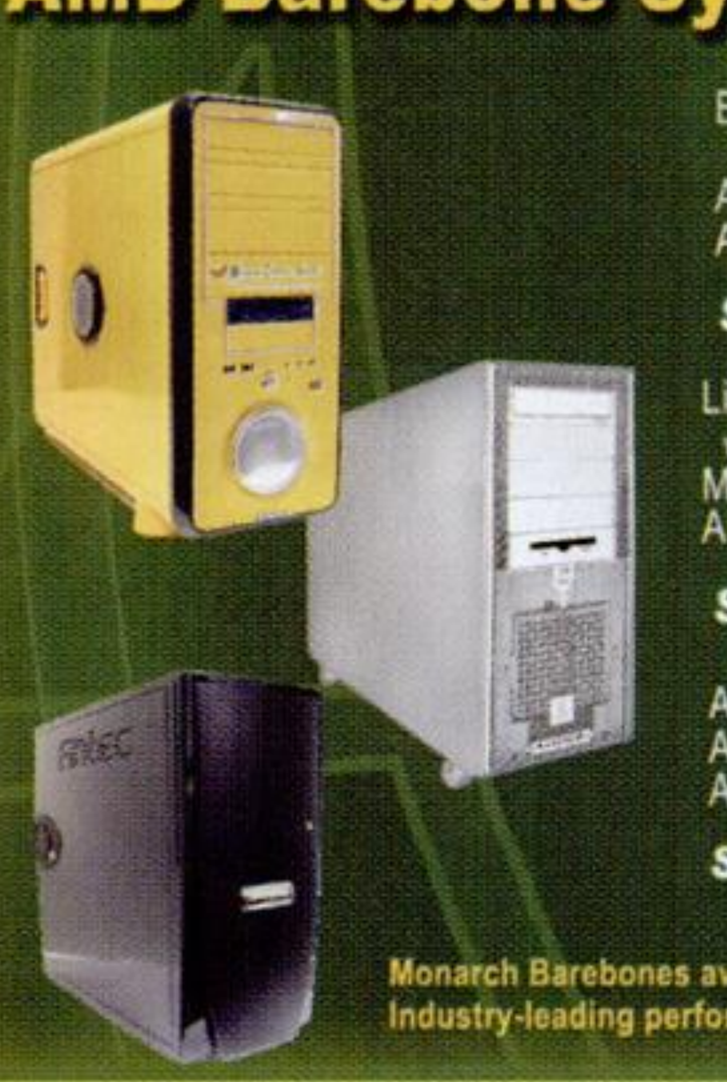

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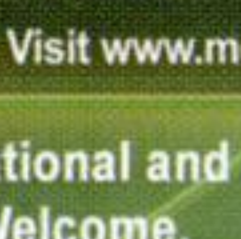

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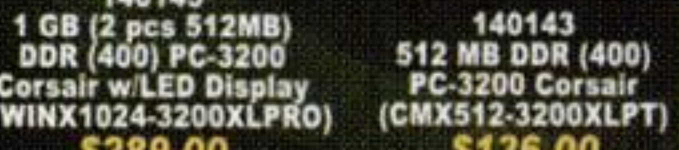

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# February

## Star Wars: Knights of the Old Republic

**Publisher: LucasArts, www.lucasarts.com**

*Knights of the Old Republic* isn't just a great *Star Wars* game; it's the best game we played in 2003. Picture a role-playing game set 4,000 years before the events depicted in the original *Star Wars* movies. You play a Republic soldier, who—gasp!—turns out to be sensitive to the Force. Your mission is to find an ancient artifact known as the Star Forge and stop Darth Malak from taking over the galaxy. Along the way, you'll bump into the most shocking plot twist we've seen since we first heard, "Luke, I am your father."

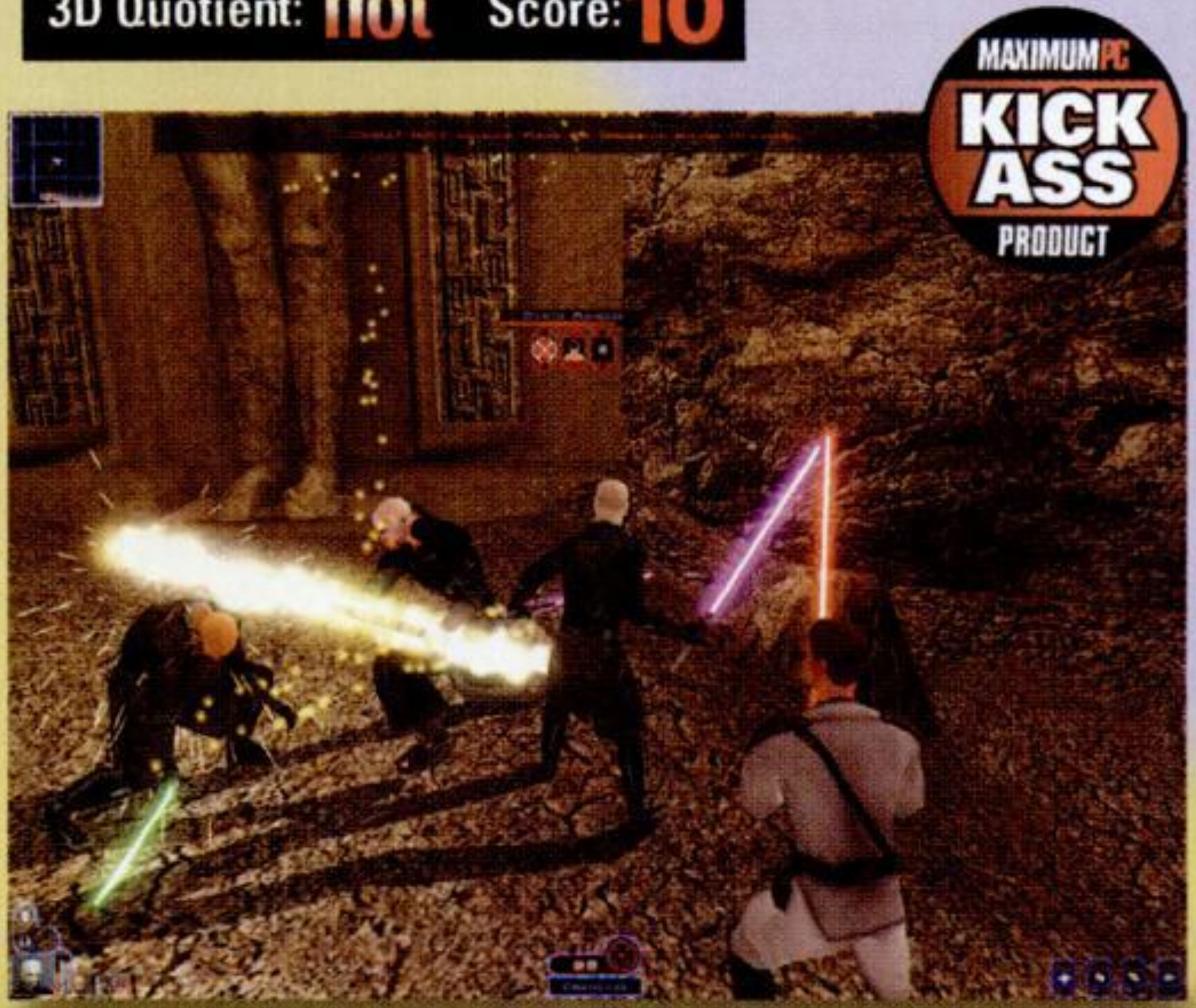
"Defeat Evil, Save the Galaxy" is the premise behind most of the games we play, but *KOTOR* offers an astounding range of choices. Your actions determine whether you're a goody-goody who follows the light side of the Force, or whether you impose your malicious will on the galaxy and become a Dark Lord of the Sith. Your decisions change literally every aspect of the experience, from dialogue with other characters to the game's ending.

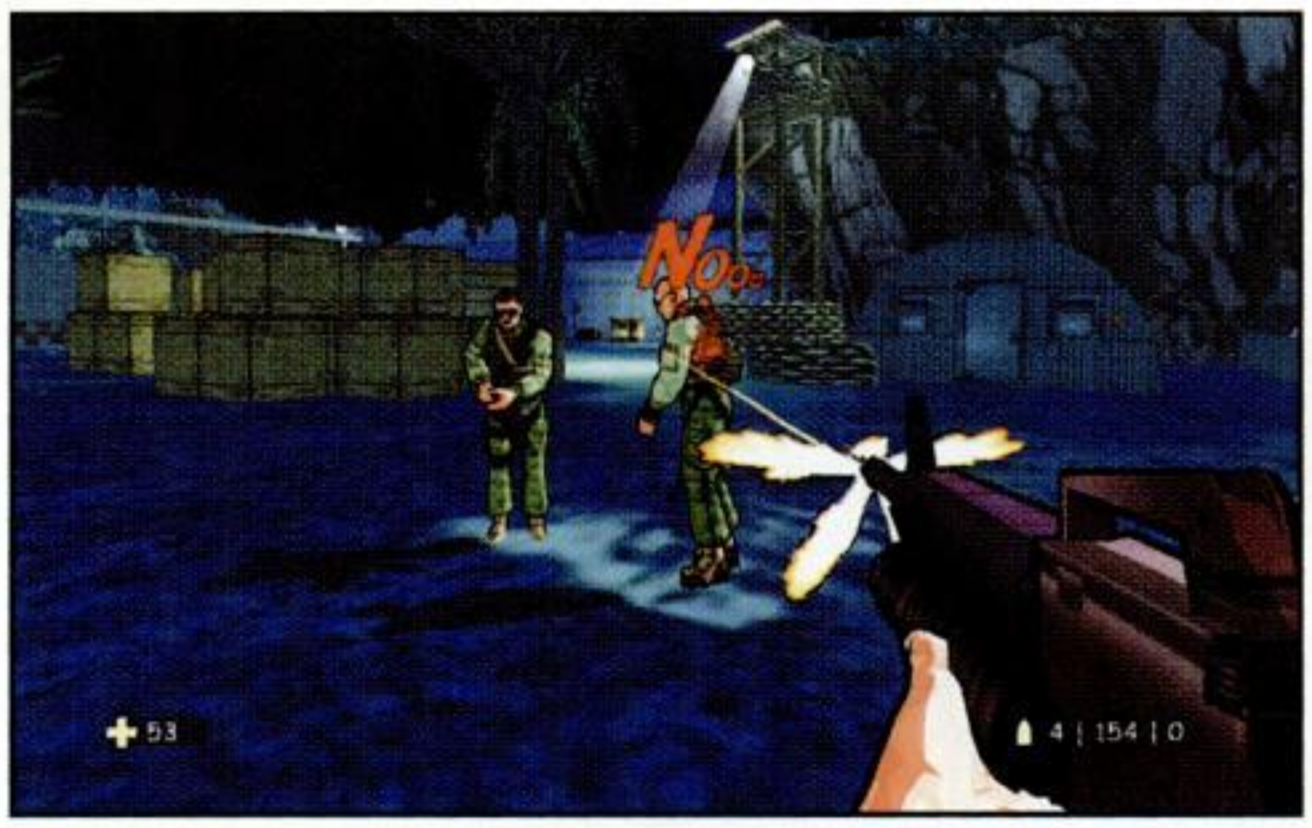
Like any good role-playing game, *KOTOR* grants far-reaching control over just about every aspect of your character and party. With six different playable classes—three civilian and three Jedi—and dozens of different Force powers and feats, you can customize your character to fit your preferred play style, be it run and gun or sly and stealthy. What's more, there's a staggering volume of equipment, armor, and weapons available, all of which can be stored in your magical bottomless inventory. Lightsabers and other special gear can even be modified with special crystals.

The texture size and particle effects are superior to those in the Xbox version, but image quality is primarily improved by running the game at higher resolutions than the Xbox supports, with antialiasing and anisotropic filtering enabled. Unlike the Xbox version of *KOTOR*, which had frame rate problems, we were able to run *KOTOR* at 1600x1200 with AA and aniso enabled without a hitch.

*KOTOR* isn't the technical accomplishment that *Deus Ex: Invisible War* is, but it has the best story we've played in a game this year. When you spend 50 or more hours playing a game, the characters need to be believable, the story must be excellent, and it has to be fun. You get all that with *KOTOR*.

**3D Quotient: hot Score: 10**



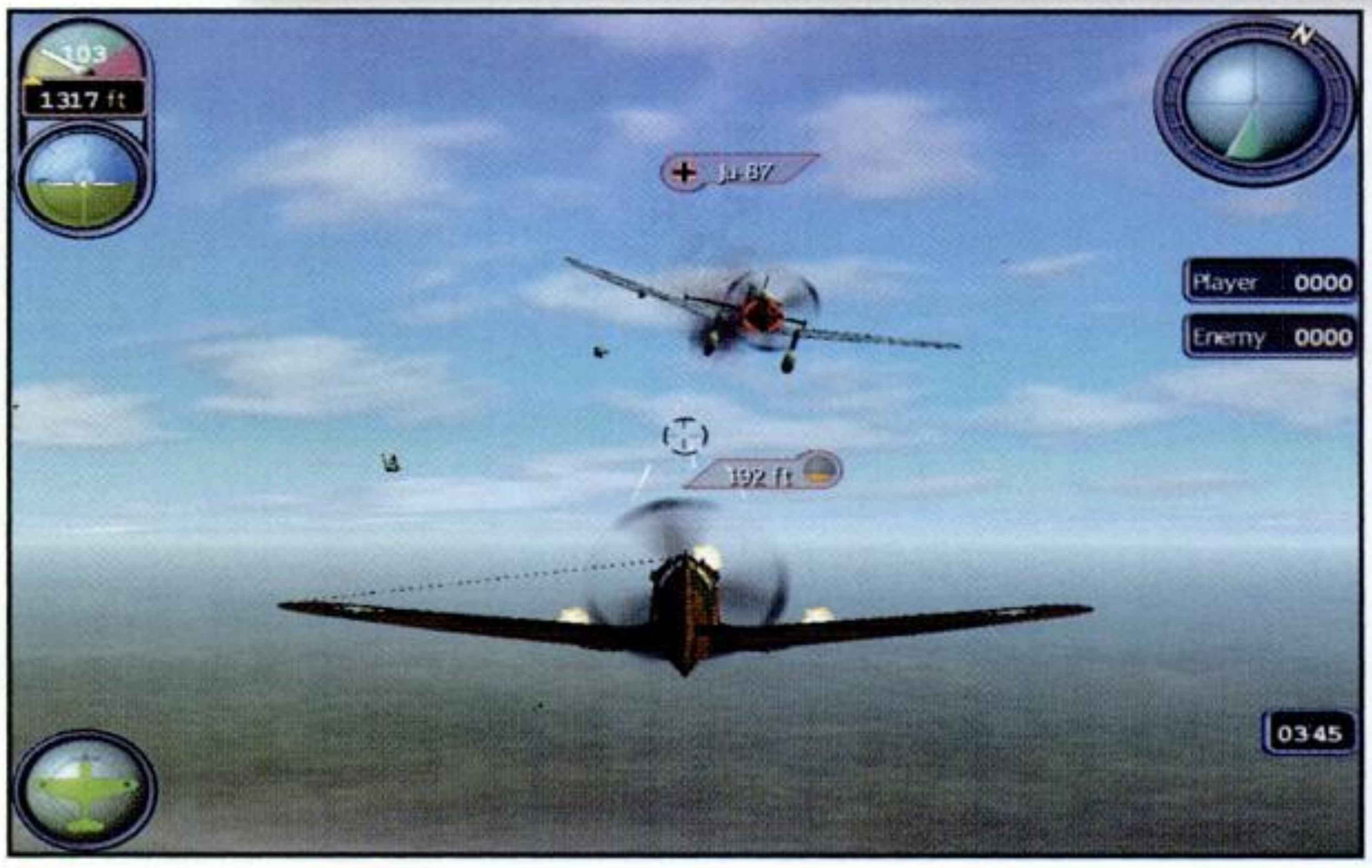


## XIII

**Publisher: Ubisoft, www.whoisxiii.com**

The first FPS to use cel-shaded polygons, *XIII* delivers an intriguing story backed by interesting and unique cartoon-style visuals. Unfortunately, the checkpoint-based save-game system is annoying, as is the need to continually swap CDs in and out over the course of the game—even with a "complete" 2.5GB install.

**3D Quotient: warm Score: 7**



## Secret Weapons Over Normandy

**Publisher: LucasArts, www.lucasarts.com**

Part World War II flight-sim, part arcade shooter, *SWON* shrugs aside its heritage and delivers a lackluster play experience further hampered by some of the twitchiest controls we've ever seen. Take a pass, and opt for *Crimson Skies* instead.

**3D Quotient: cool Score: 6**

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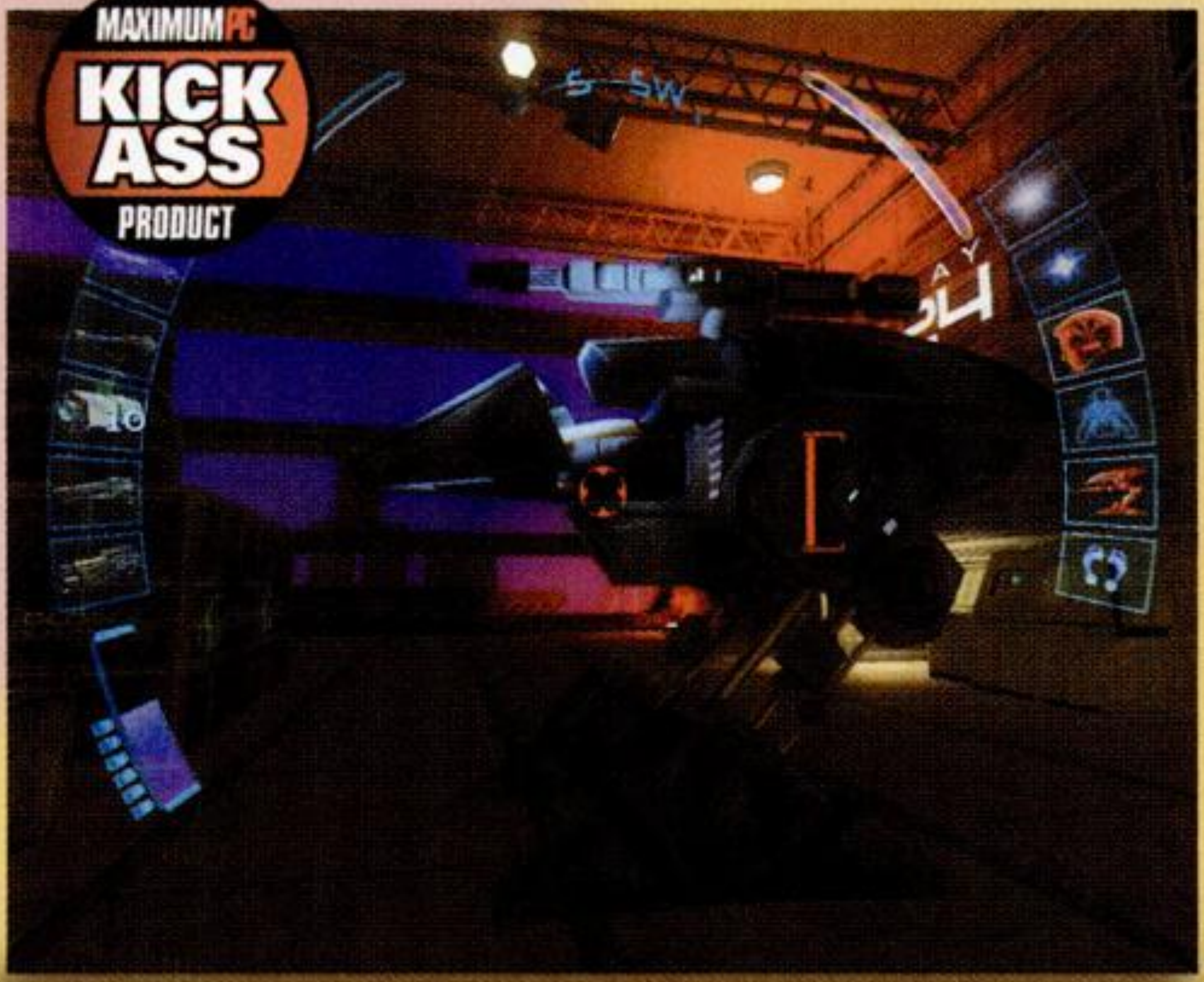
## *Deus Ex: Invisible War*

**Publisher: Eidos Interactive, www.deusex.com**

The first *Deus Ex* game represented a watershed moment in gaming. Instead of locking gamers into a completely linear, scripted series of missions, *Deus Ex* put forth a more flexible gaming experience wrapped in a dystopian near-future sci-fi shell. You could play however you wanted, using multiple methods to overcome any obstacle. But your actions never really impacted the game's plot.

*Deus Ex 2: Invisible War* moves this concept forward with truly open play. Your choices not only affect and determine your personal play style; the ramifications of these decisions can change the direction of the story. The developer, Ion Storm, used an extensive faction system to create a dynamic, interactive world that up until now has only existed in massively multiplayer RPGs.

Every character you meet belongs to a faction. Your standing with a faction determines whether its members perceive you in a friendly, indifferent, or hostile fashion. Your actions in the game affect your faction standing. Dig: At one point early in the game, two opposing factions will send you to see the same woman. One faction will want you to kill her, while the other wants you to collect an object from her. Whacking her will make one faction happy, but then the other faction will be pissed that you didn't collect the object. To complicate matters further, your target is a stringer for a third faction, and killing her will irk them as well. The way you handle each mission has a bearing on the way other characters in the game react to you, from pivotal players down to singularly minded grunts.



Your gear and biomod selections provide even more variability by allowing you to customize your play style to suit your personal gaming preferences. *DX2* features 15 different types of biomods. Each gives you special powers, like silent walking, hacking skills, or the ability to regenerate health. You can use only five biomods, though, so you'll have to pick and choose carefully.

Our only complaint with *Invisible War* is the console-style interface, which doesn't work well with the mouse. It's difficult to know, for example, what something as basic as a mouse click will do when you click a gun in your inventory.

Still, *Deus Ex 2* is easily one of the best-designed PC games of the year, and well worth your time.

**3D Quotient: smokin' Score: 9**

# March

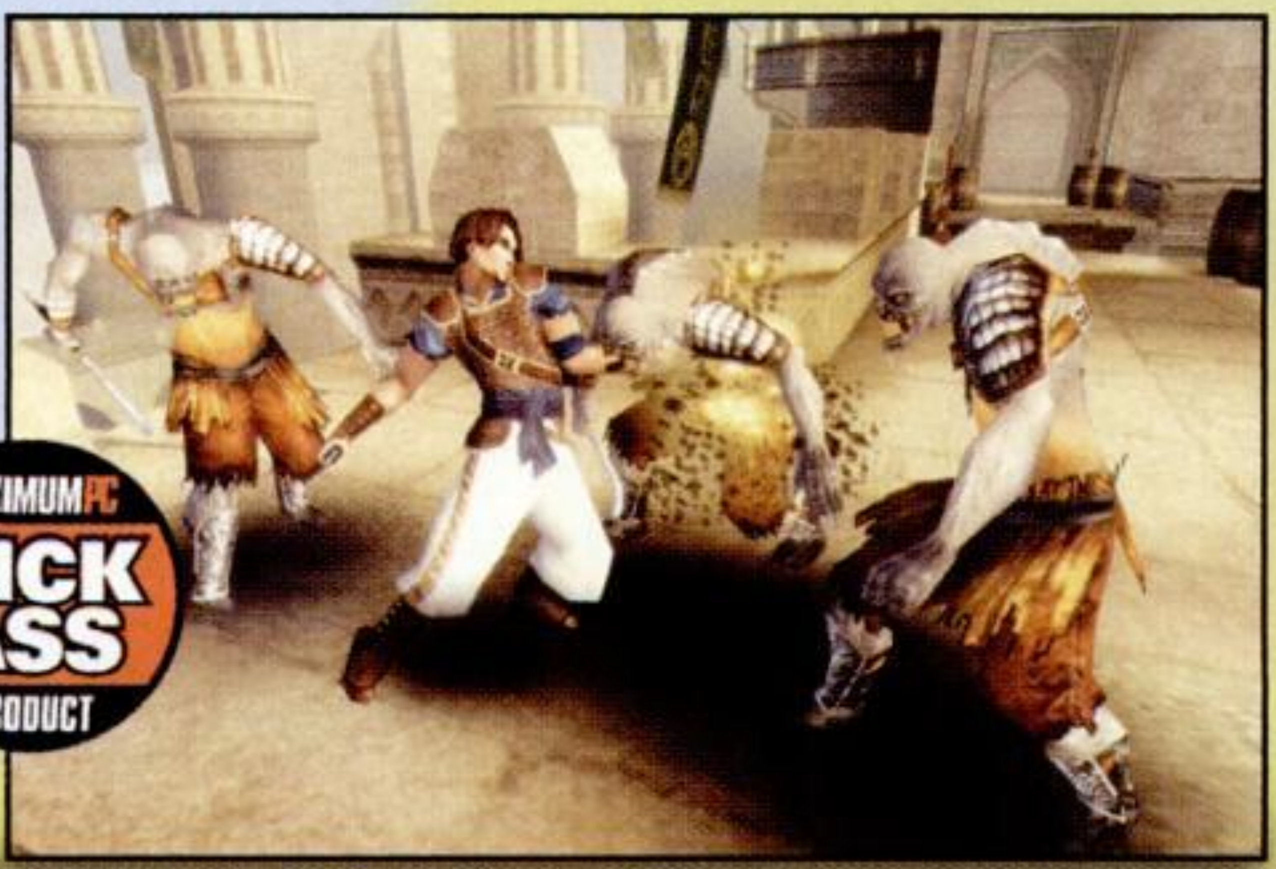
## *Prince of Persia: The Sands of Time*

**Publisher: Ubisoft, www.princeofpersiagame.com**

You may not remember the original *Prince of Persia* game from 1989, or even the 3D version released a few years ago. You will, however, remember *Prince of Persia: The Sands of Time*. It's one of the best all-around games we've ever played.

In the game, you play as the noble prince, who inadvertently kills his family by opening up a floodgate of sorts that releases the Sands of Time. Your mission is to recollect the sand and hopefully turn back time in order to get your family back.

Over the course of this delightfully sophisticated 15-hour adventure, the prince encounters a variety of challenges ranging from gnarly jumping puzzles to battles with the undead. The play mechanics are biased toward tricky navigation and puzzles, and much like the original game, they consist mainly of moving from location to location over chasms, cracks, buzz saws, spikey poles, and other potentially deadly hazards. *Prince of Persia's* genius is that these puzzles and sequences often challenge your mind more than your reflexes. And they rarely grow old, frustrating, or boring. Another great touch is the ability to rewind your most recent actions, which is handy for replaying fatal sequences.



When the affable prince isn't swinging around like a chimp, he's busy dishing out Persian pain. Hand-to-hand combat is excellent and sets a new standard for third-person fighting, thanks mostly to an arsenal of flamboyant moves and easy-to-use controls. The prince is capable of spectacular attacks and finishing moves that would make Jet Li jealous. *The Sands of Time* is a brilliant game, and will surely surprise you.

**3D Quotient: hot Score: 9**

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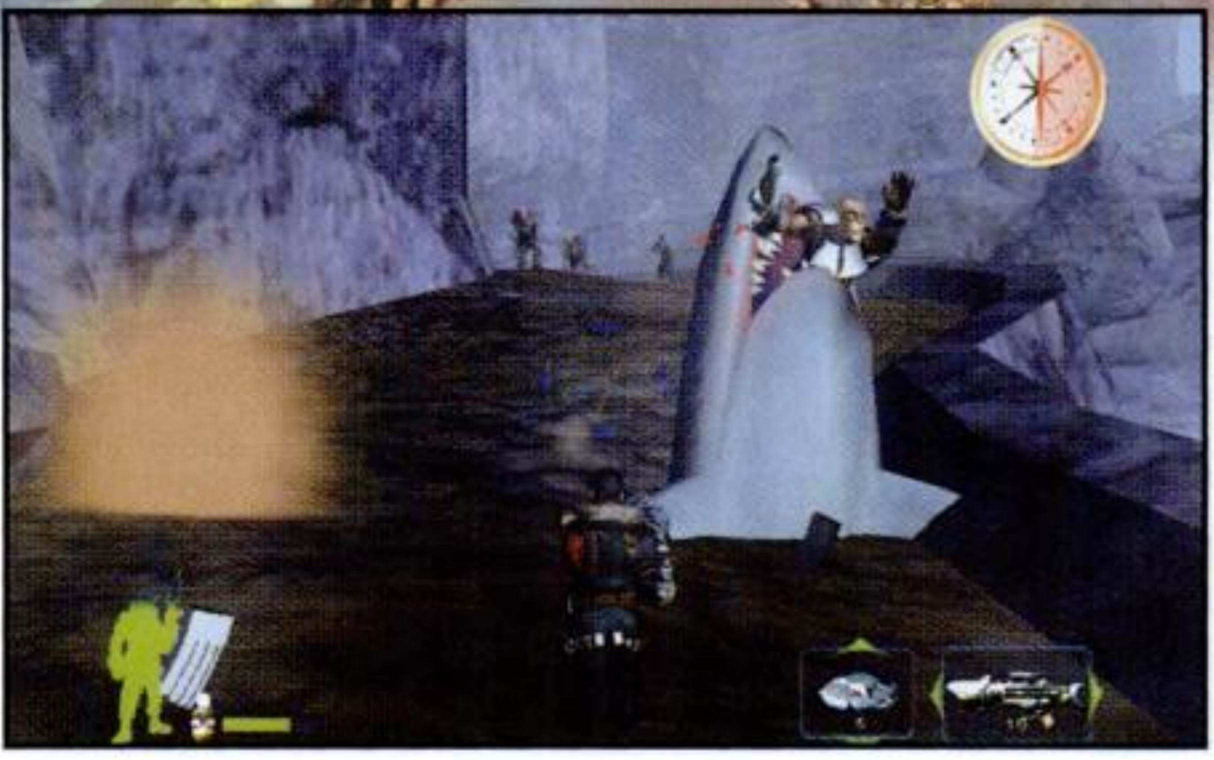
## Armed and Dangerous

**Publisher: LucasArts, www.lucasarts.com**

Lots of clever ideas unfortunately get obscured by repetition in this quirky action-fest from the creators of *Giants: Citizen Kabuto*. Playing as a member of a trio of wacky mercenaries, you must depose of a tyrannical king—battling seemingly endless waves of similar enemies with the same ol' weapons.

**3D Quotient: warm Score: 7**

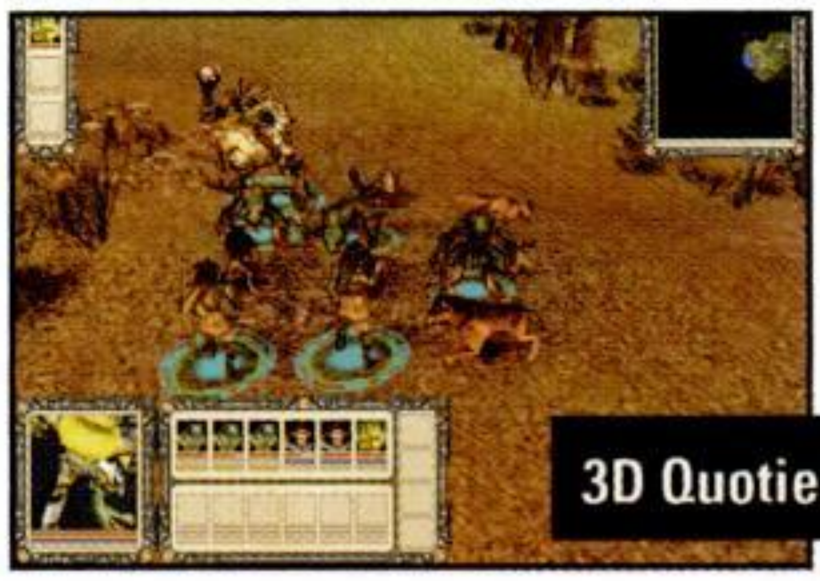


# April

## Lords of Everquest

**Publisher: Sony Online Entertainment, www.lordsofeverquest.com**

While not an awful game, *Lords of EverQuest* is a blindingly mediocre RTS that offers little in the way of compelling, original content—outside of its *EverQuest* universe setting. The generic RTS formula may have been acceptable if it weren't for the unbalanced hero units and truly horrid AI.

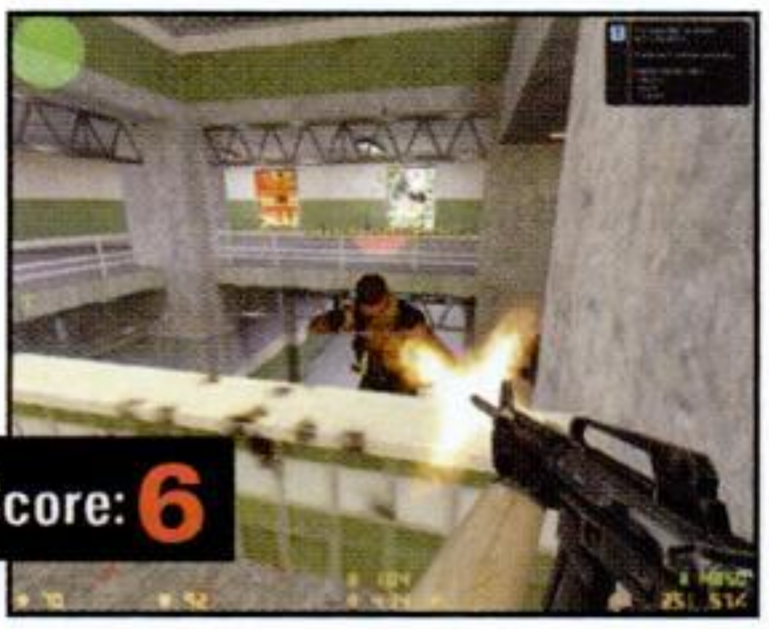


**3D Quotient: warm Score: 4**

## Counter-Strike: Condition Zero

**Publisher: Sierra Entertainment, www.counter-strike.net**

This long-awaited single-player expansion to the immensely popular—and free—*Counter-Strike Half-Life* mod does far too little to warrant shelling out dough for it at retail. The AI is solid, and the single-player quotient is mildly entertaining; it just suffers from a "been-there, done-that" feel throughout.



**3D Quotient: warm Score: 6**

## Beyond Good and Evil

**Publisher: Ubisoft, www.beyondgood&evil.com**

*Beyond Good and Evil* is a console platform title that's been ported to PC. This is evidenced by the absence of the mouse cursor in any of the game's menus. Although other signs of console-itis are plentiful, the game is so good we're overlooking such minor nuisances. The story has you playing as a feisty action photographer named Jade, whose hometown is under siege by a faceless corporation that has begun abducting her fellow citizens. It's up to Jade to save her village—and humanity—by uncovering the conspiracy and putting an end to the evildoing once and for all.

This is typical platform fare, but dull moments are few and far between. In addition to the standard puzzle navigation, stealth missions, and hand-to-hand combat, Jade also gets to compete in a series of hovercraft races. The best part: no jumping puzzles! The only flaw is that the clunky console-based interface makes it difficult to manipulate the collection of maps and goodies Jade gets her hands on.

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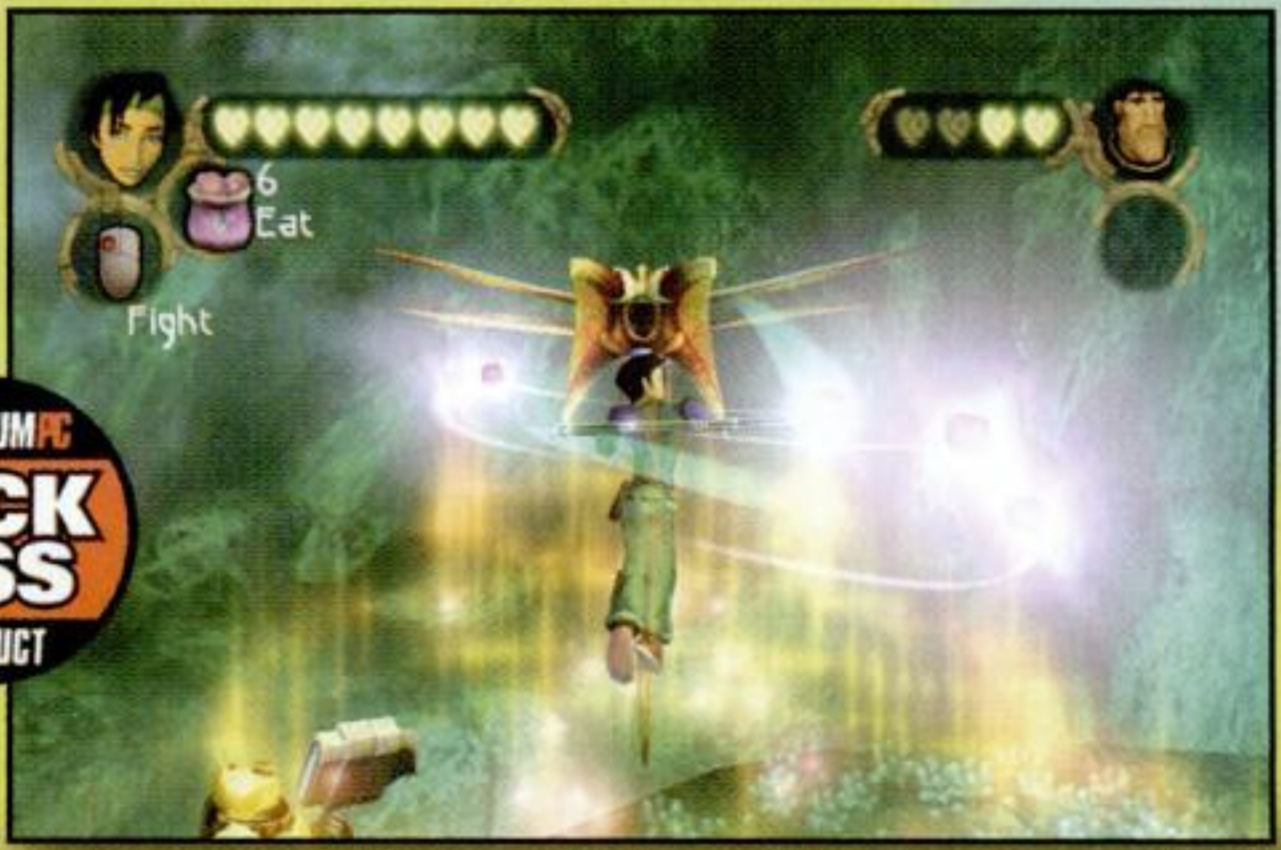


**3D Quotient: warm Score: 9**

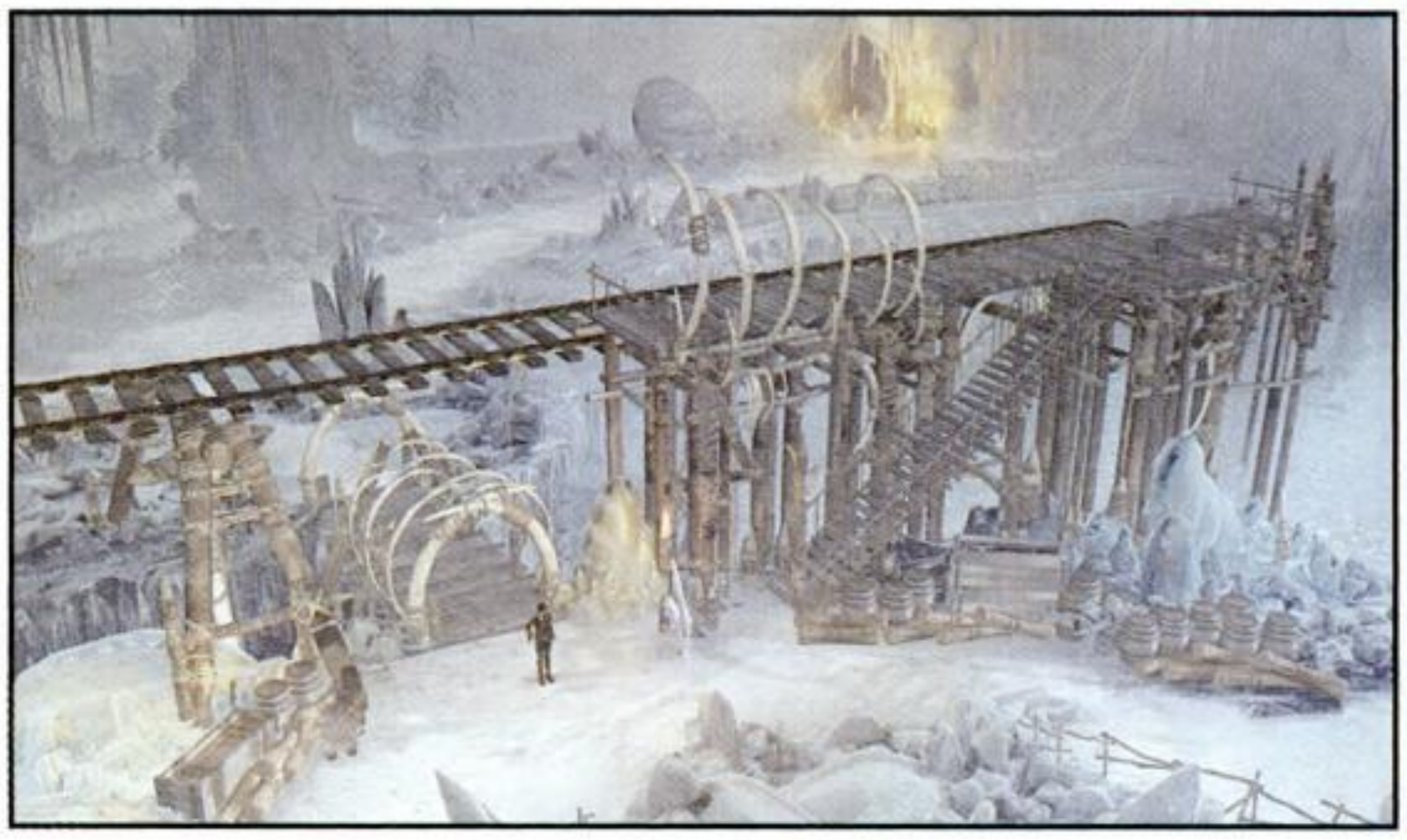
# May

## Syberia 2

**Publisher: The Adventure Company, www.syberia.com**

A fantastic adventure game set in a mythical realm, *Syberia 2* is a breath of fresh air. Its visuals, which pair 2D rendered backdrops with 3D character models, are intoxicating. And the sound effects are mesmerizing. While there are too many puzzles that feel like time-consuming filler, the strong story manages to overcome this potential pitfall.

**3D Quotient: cool Score: 7**



# June

## *Far Cry*

**Publisher: Ubisoft, www.farcrythegame.com**

After playing the surprisingly entertaining demo released a few months ago, we had a hunch *Far Cry* would be decent. But none of us expected the final release to be this good. And by good, we mean it's probably the best first-person shooter we've played since *Half-Life*. Yes, that good.

Like most genre-toppers, *Far Cry* excels in not just one category of play, but practically every category, thanks to its incredible graphics, interesting plot, and appealing level design. Even more amazing, *Far Cry* comes from a previously unknown developer, Crytek, which created its own graphics engine, the Cryengine.

This is the first game we've seen that takes advantage of the gorgeous effects made possible by DirectX 9 and shaders. For example, when you're looking down a hallway that's being pumped with vapors from a heat pipe, everything behind the heat blast shimmers realistically like hot asphalt in the Summer. When set to the Ultra High graphical setting, the game's water reflects everything around it, including mountains, stars, and the sun or moon. Additionally, every object casts a shadow. And this effect is further amplified by the fact that almost every object is dynamic: If you shoot a hanging light, its shadow dances around the room like that of a real-world moving object. Obviously, all this 3D-shader glory requires a heavy-duty graphics card—even our Radeon 9800 Pro was spinning its fans so loudly after a few hours, there was probably sweat dripping off the AGP slot.

As impressive as the next-gen graphics engine is, the team-based AI is easily the most intelligent we've seen to date. If you snipe someone from a kilometer away, nearby squad-mates will brandish their weapons and scan the horizon while taking cover or calling for reinforcements. Which leads to another interesting twist: Because the enemy AI reacts dynamically to situations, you can play the same level repeatedly with different experiences and outcomes every time.

And you'll have plenty of chances to replay missions—*Far Cry* is extremely challenging. Even the most hardcore PC gamers' skills will be tested in this game's final levels. Thankfully, the trials are immensely rewarding given the well thought-out level design and realistic enemy combatants.

**3D Quotient: smokin' Score: 9**

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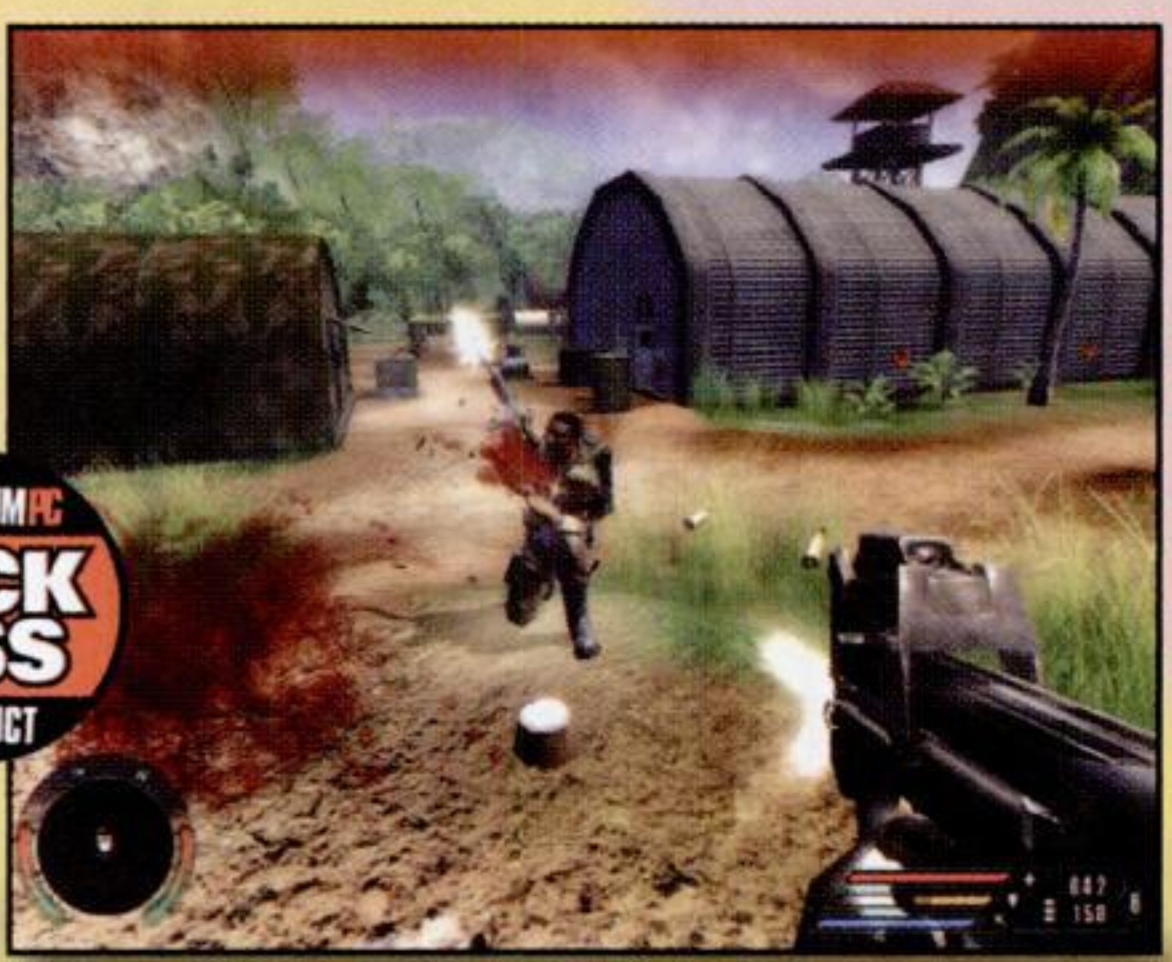


## Increase Your *Far Cry* Performance

*Far Cry* should be called "PC Cry" because it takes a tough PC to survive the game's visual demands. Whether your system is high-end or rear-end, these tips will help you find its sweet spot.

Special effects: The two most demanding video options are anti-aliasing and anisotropic filtering. Setting the water detail to "ultra high" will also cause a major frame hit (because it reflects everything), and setting shadows above "medium" is costly too. If you're running a GeForce FX card, set the lighting quality to "high" rather than "very high."

Video settings: The video settings for low, medium, and high generally use Pixel Shader 1.1, whereas settings "very high" and above use Pixel Shader 2.0.

Custom configuration: Use the nifty configuration tool named FarCryConfigurator.exe within the game directory in the "bin32" folder to examine and tweak all the game's settings.

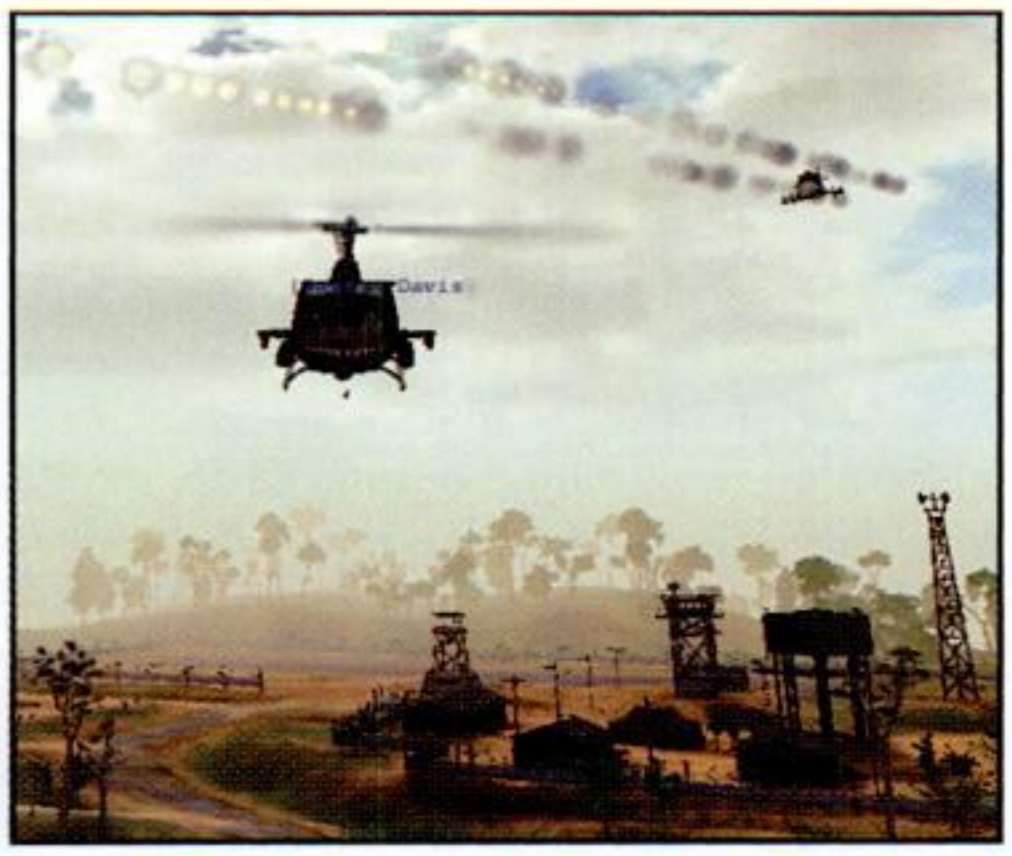
Special console commands: Our two favorite console commands are "\r_displayinfo 1" to see the frame rate and polygon information and "dumpcommandsvars" to create a text file of the game's numerous console commands. Also, if you add "-devmode" to the end of the target line of the shortcut's properties, you can enter the game, hit the console with ~, and type "\ca_drawbones 1" to see the skeletal animation system.

## *Battlefield Vietnam*

**Publisher: Electronic Arts, www.eagames.com**

While not up to the high standards set by *Battlefield 1942*, *Battlefield Vietnam* does a good job of putting you into the "bush" of Southeast Asia. With plenty of ground cover, thickets of trees, and swamps to lurk in, firefights are typically in close confines, and frenetic. The stars of the show are the vehicles, particularly the helicopters, which can be used to ferry troops and equipment about the battlefield—and to blow stuff up, naturally. Unfortunately, the flora doesn't provide any real cover, as changing the detail settings can strip it all away and expose you to instant, virtual death. The game's a real performance hog, even compared to its predecessor.

**3D Quotient: smokin' Score: 8**



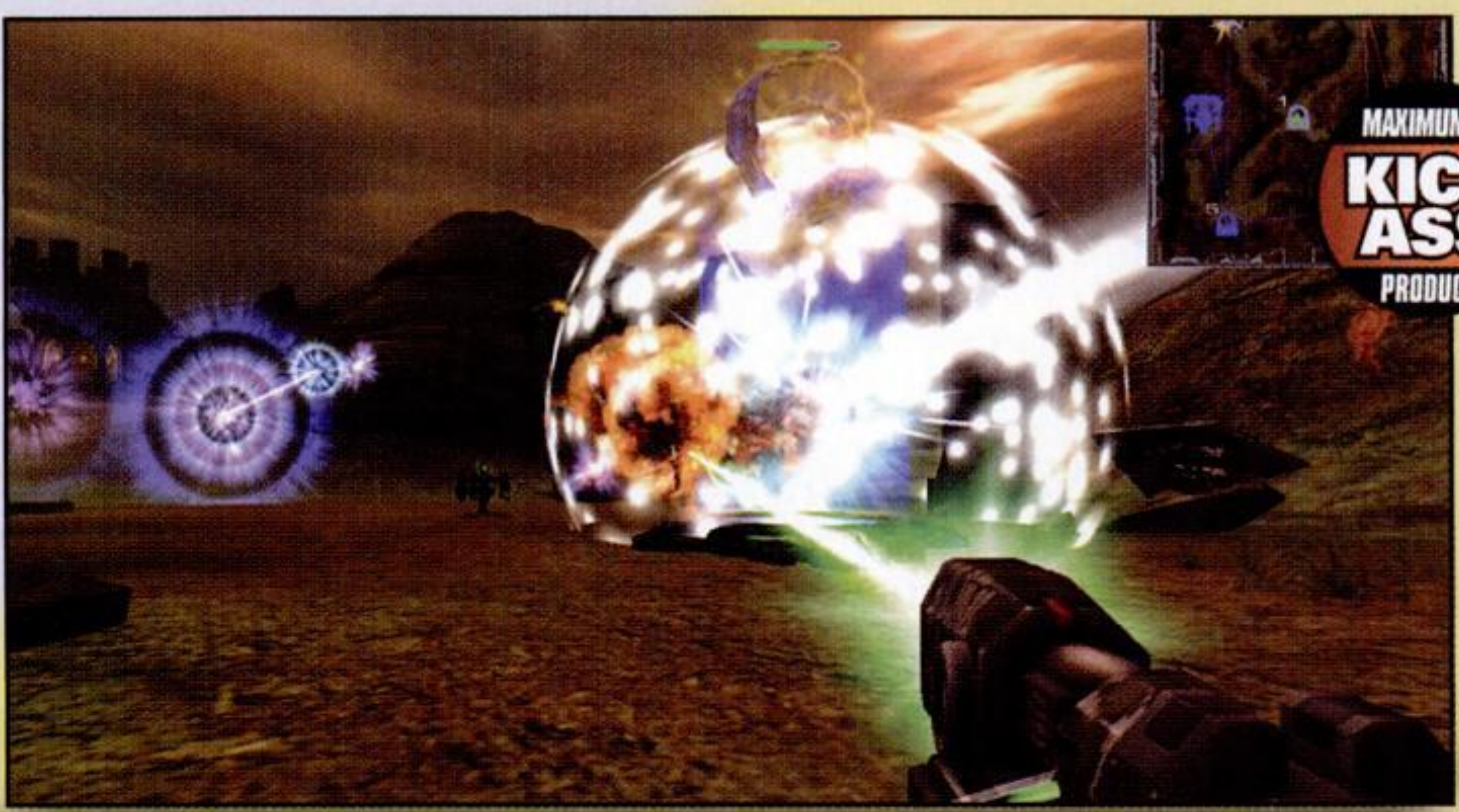
## Unreal Tournament 2004

**Publisher: Atari, www.unrealtournament.com**

We've been stuck in the mud cradling our authentic bolt-action rifles for so long, we almost forgot how much fun it was to dash around maps at full speed, or how fulfilling it is to assail a newbie with flak and taunts of, "You play like a girl!" Reality-based shooters are fine and all, but they have dominated the online and offline FPS scene for so long that the arrival of the frenetically paced and ridiculously over-the-top *Unreal Tournament 2004* is a huge breath of fresh plasma.

As fanboys of the original *UT*, we were none too pleased with last year's sequel, *Unreal Tournament 2003*. Most of the weapons felt watered down in terms of range and power, and the new maps failed to excite us like those in the original game.

Luckily, that has changed in this year's version, because Epic Games has gone back to *UT's* roots. The weapons have been rebalanced, and new armaments like the spider mines and the anti-vehicle rocket launcher are fun to wield. On top of this, Epic has revived our favorite game mode from the original—Assault—and added an awesome new challenge called Onslaught that consists of huge, wide-open maps, all-new vehicular combat, and node-oriented warfare that makes for riveting back-and-forth battles. And, because all the content from *UT2K3* is included, you essentially get two games in one.



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*UT2K4* features 10 different game types, so it's likely you'll find a style that appeals to you. The package also includes several new one-on-one deathmatch maps for the hardcore crowd, six Assault maps, and nine Onslaught maps. *UT2K4* is the best value we've seen in a long time. Between the online and offline play, and the myriad game types, it'll be a long time before you get bored. But most importantly, it's F-U-N.

**3D Quotient: smokin' Score: 9**

## Get the Most from UT2004

*UT2K4* is highly customizable. You can make lots of tweaks and hacks to adjust performance, graphics, and unlock secret effects. To use these tech tips, go to C:\UT2004\System\UT2004.ini and open the file in Notepad. You should make a backup of this file as well, just in case.

***Use more of your system memory:*** Find "CacheSizeMegs=32" and change the number to whatever amount of system memory you'd like the game to use. As a general rule, set it to about 200MB less than your total because you need some memory to run your OS. The result will be faster level-loading times.

***Keep frames up:*** Locate "MinDesiredFrameRate=35.000000" and input your minimum desired frame rate. The game will automatically toggle the visual eye candy to match the number you select.

***Increase your net speed:*** The default setting of "ConfiguredInternetSpeed=10,000" means you download info at 10kb/s, but for LAN play, or if you have a T1 connection, set the number to 20,000. Modem users should set it to about 5,000.

***Play your own music:*** Hit F11 in-game to open the included MP3 player. Select which files you want to hear and commence rocking.

***Select alternate horn sounds:*** Every vehicle has a funny, alternate horn. To enable it, press "~" to open the console and type "set input X playvehicle horn 1" where X can be any key. Once in a vehicle, press X to hear the funny horn.

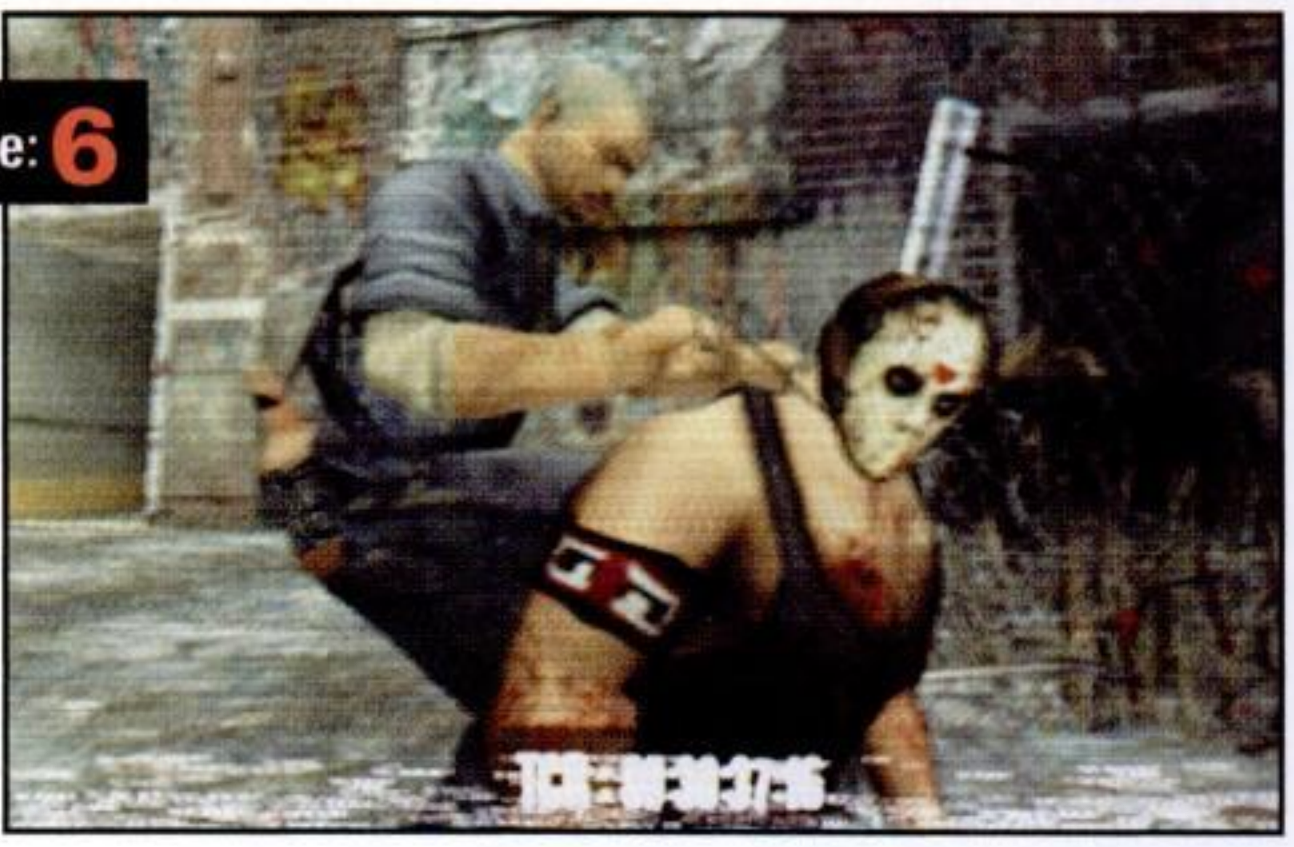
## July

**3D Quotient: warm Score: 6**

### Manhunt

**Publisher: Rockstar Games, www.rockstargames.com**

To get a pardon from the electric chair, death row inmate James Earl Cash agrees to kill off all the deranged gangs that populate Carcer City—all for a snuff-film peddler's latest production. You of course are the star, and over the course of a single night you must dispose of the gangsters using a dizzying array of murderous instruments, some as innocuous as a plastic bag. The third person game's stealth quotient is quite fun, but the game quickly gets bogged down by repetitive gunfights and less than stellar AI. As one of the most violent games ever made, it's also not for the squeamish.



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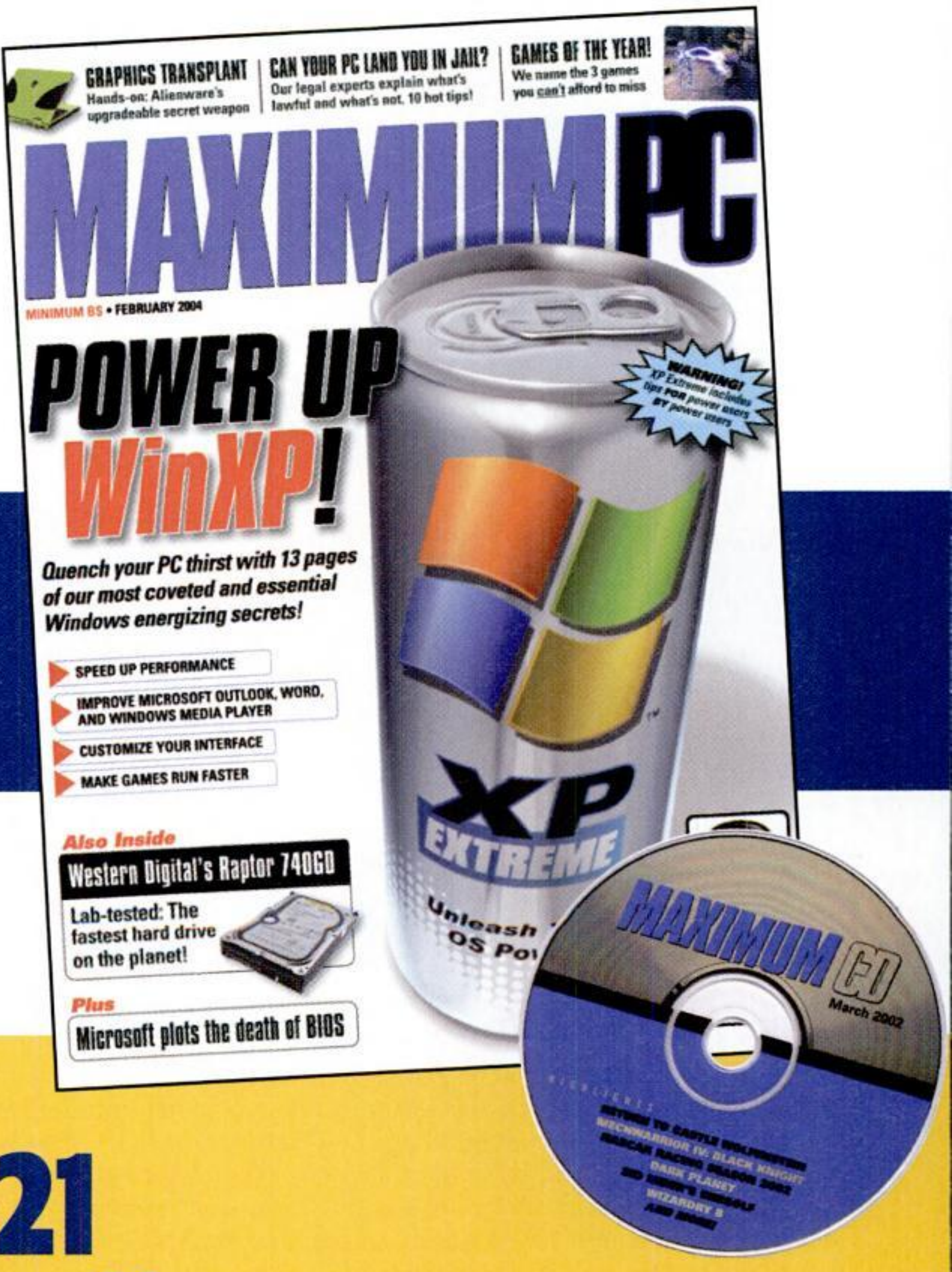
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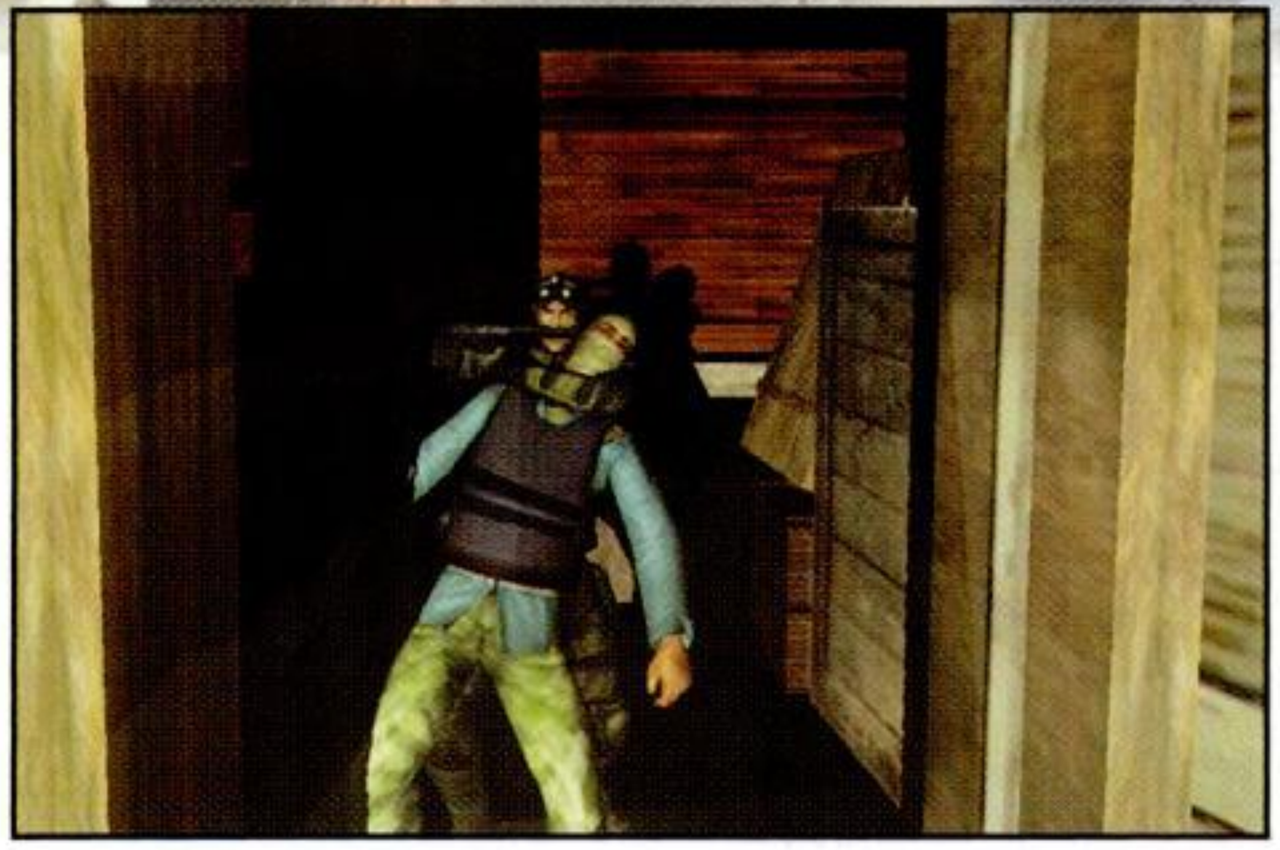


## Splinter Cell: Pandora Tomorrow

**Publisher: Ubisoft, www.splintercell.com**

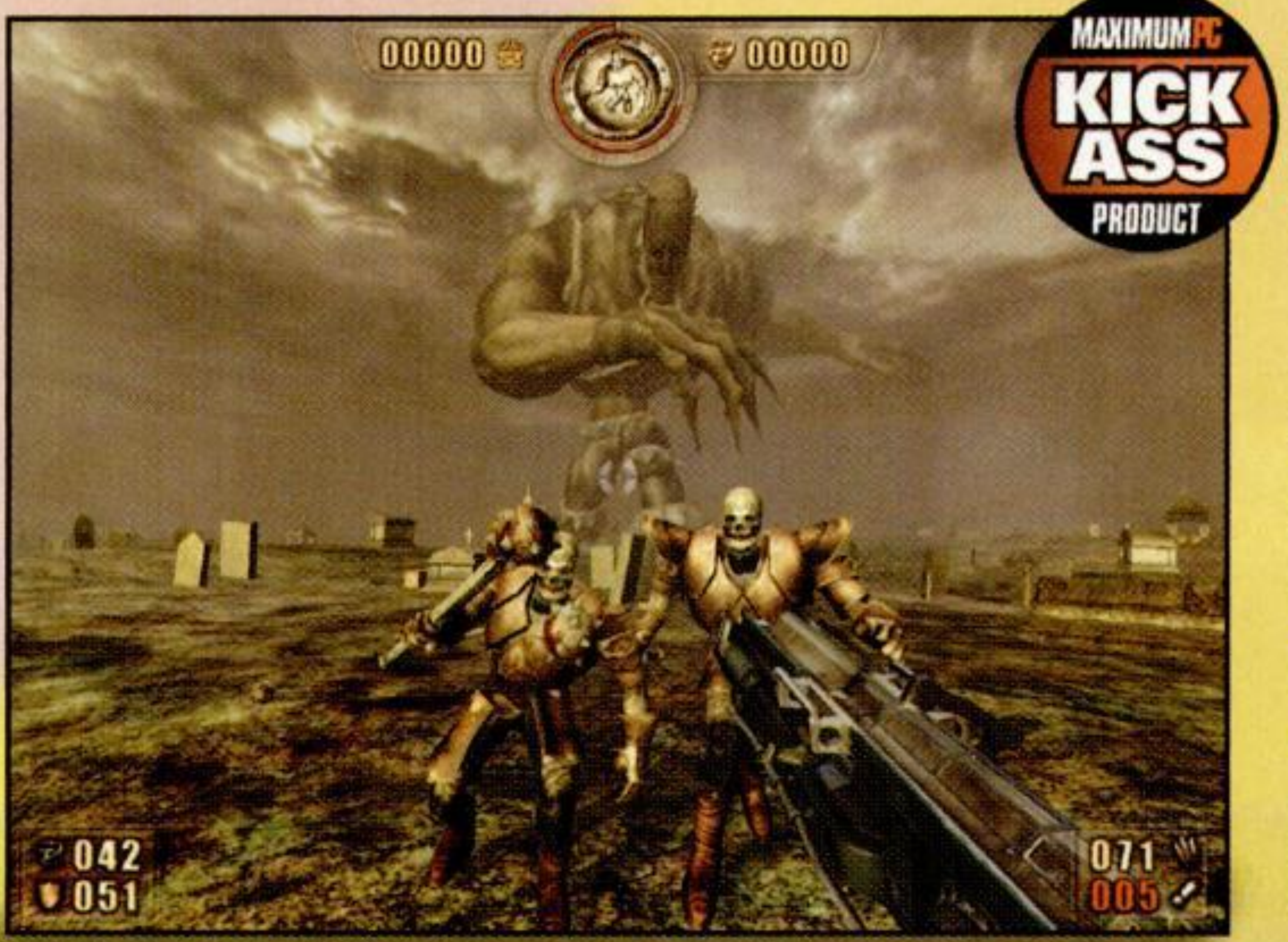
*Pandora Tomorrow* is really two games in one—a third-person sneak-and-steal game just like the original, and a nail-biting multiplayer game that pits good against evil. And this is a very good thing because now that the originality of *Splinter Cell's* steath factor has faded a bit, the mildly generic single-player quotient found here feels much too repetitive, though it remains enjoyable. The original cat-and-mouse multiplayer games save the day, delivering ultra-suspenseful two-on-two matches of spies versus mercenaries in compact, intense levels.

**3D Quotient: hot Score: 8**

## Painkiller

**Publisher: DreamCatcher, www.painkillergame.com**

Scattered bones slither together to form skeletons that rush at you with gaping maws. Flesh-deprived archers realize they're losing a battle and suddenly begin firing upwards, bringing down a ballroom-size chandelier onto your head. A 15-story-tall beast shatters a pillar, dropping massive stone ruins into your path as you attempt to flee, squirting urine with every frightful step. This is but a snapshot of the action in *Painkiller*—a grim and relentless crusade that combines the frenzied backwards-shooter action of *Serious Sam* with gorgeous graphics, over-the-top physics, and bowel-loosening thrills.



*Painkiller* casts God as a micromanager who assigns newly deceased crash victim Daniel Warner the task of assassinating four generals of the underworld in order to prevent a coup by Lucifer himself. Standing in Warner's way are thousands of low-level chumps who aren't about to give up their hellish pension and benefits without a fight.

As you play, familiar enemies learn new tricks and combine forces to develop new attacks. Some opponents will grab nearby associates and use them as shields and projectiles. Weak enemies in large numbers will cluster around a stronger foe, or spread out to diminish the effect of your weapons.

Massive waves of lesser enemies are interspersed with boss battles against Lucifer's generals. Each of these behemoths is an intimidating, sky-scraping abomination in command of fire, earth, air, or water. Unlike the battles with the bulk of your antagonists, defeating these bosses requires as much strategy as firepower.

*Painkiller* deftly avoids the impression that Hell has just one interior decorator. Textures are unique to each level, and each environment has its own crepuscular charm. You'll go from crumbling ruins to gaseous swamps to claustrophobic cottage interiors to huge military hangars. Hell even sports its own opera house, an indication that, in addition to having a sense of humor, the game's developers have imbued *Painkiller* with enthusiasm, character, and atmosphere. More evidence of the high-quality design: the frequent appearance of checkpoints *and* the option to save whenever you'd like.

**3D Quotient: smokin' Score: 9**

# August

## City of Heroes

**Publisher: NCsoft, www.cityofheroes.com**

We've always wanted to be a superhero, the type of do-gooder who can fly above the clouds, scale tall buildings, and terrify criminals in dark alleys while our cape flows menacingly behind us. With *City of Heroes*, we can finally perform all these feats and more—without any fear that videos of us pretending to be a superhero will wind up on the Internet. This comic book–oriented massively multiplayer game is a superhero sim of sorts. You choose the type of hero you want to be and then set out to fight crime and vanquish evil in a metropolis called Paragon City. There's never been an online role-playing game this easy to get into.

**3D Quotient: hot Score: 9**

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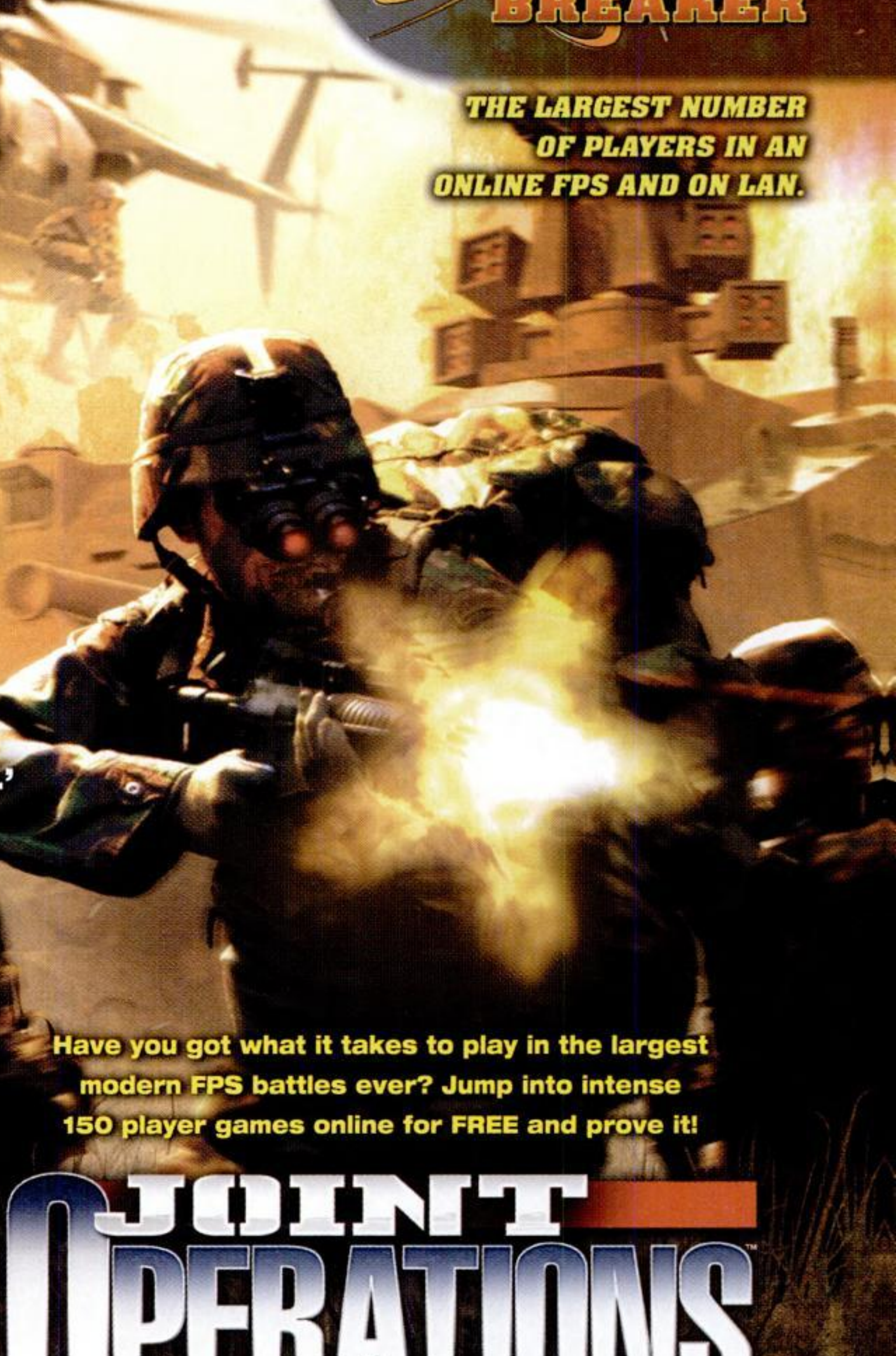

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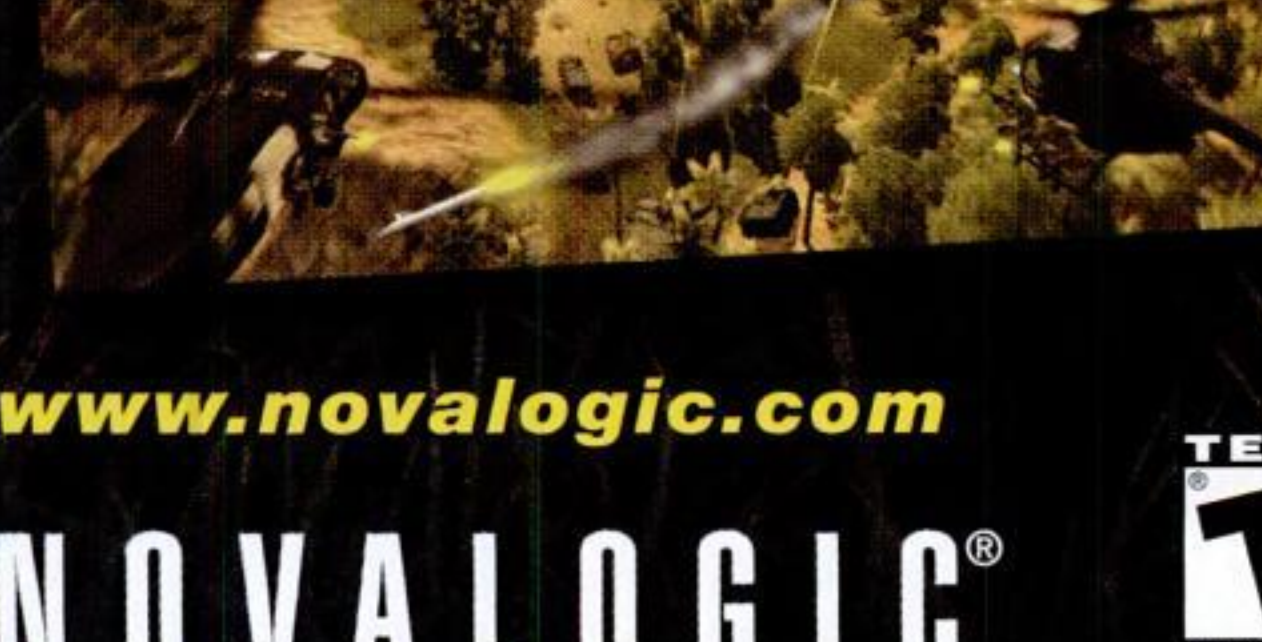

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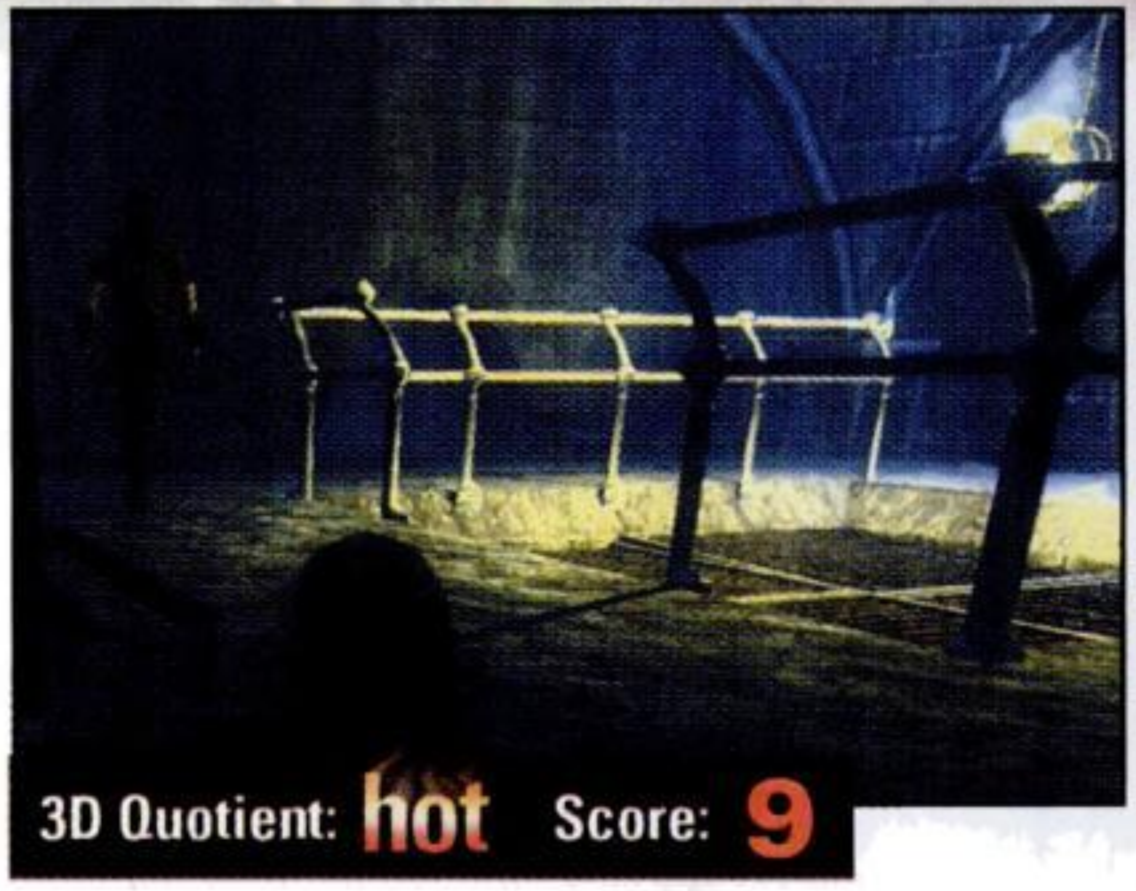
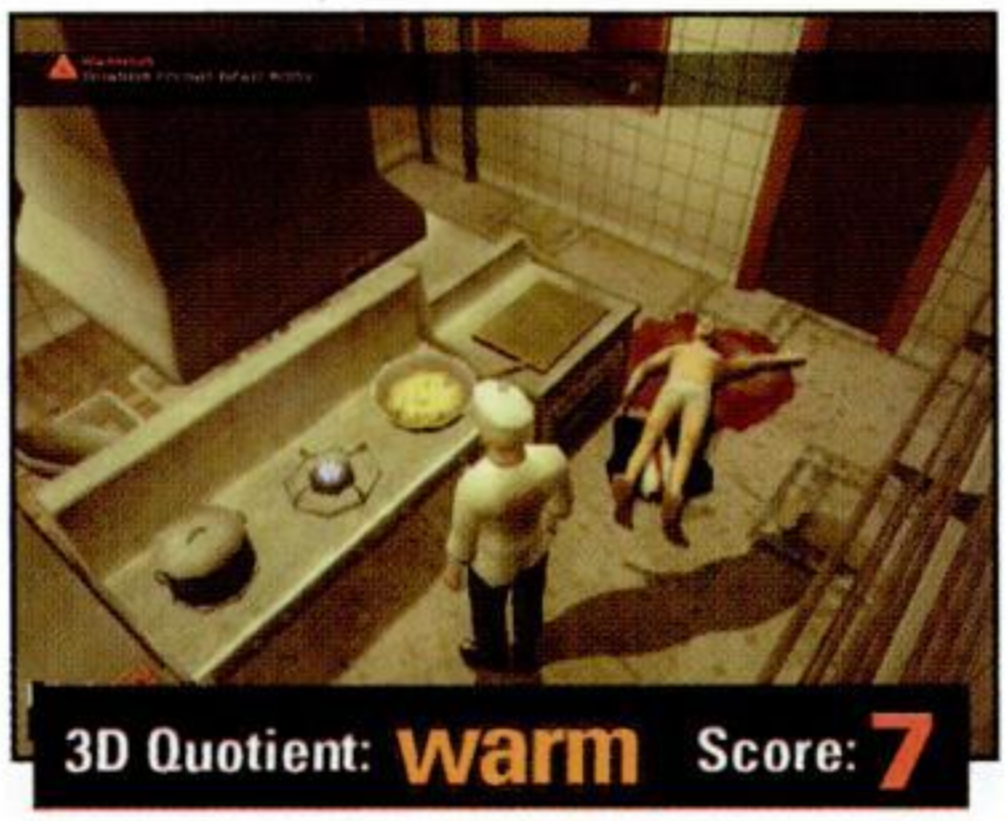
## Thief: Deadly Shadows

**Publisher: Eidos, www.thief3.com**

The city is a harsh mistress, full of scoundrels who will roll you for a handful of gold coins. Refreshingly, in *Thief: Deadly Shadows*, you're one of the scoundrels. You play as Garrett, a master thief living off the involuntary generosity of others. You sneak and steal your way through castles and catacombs, and in the process, uncover the truth behind a plot to unleash a dark age upon a world that's already pretty darn dark. Gameplay has remained relatively unchanged from the first two *Thief* games. You sneak around in the shadows and avoid guards while getting from point A to treasure B. Unlike the two previous installments, however, *Deadly Shadows* allows for relatively open-ended exploration of the game's city, aptly dubbed "the City." Between missions, you can walk about freely pick-pocketing noblemen, robbing homes, and avoiding the law. Though the slow pace will turn off gamers more into straight-ahead action, *Deadly Shadows* is absolutely essential for stealth-game fans.





## Hitman: Contracts

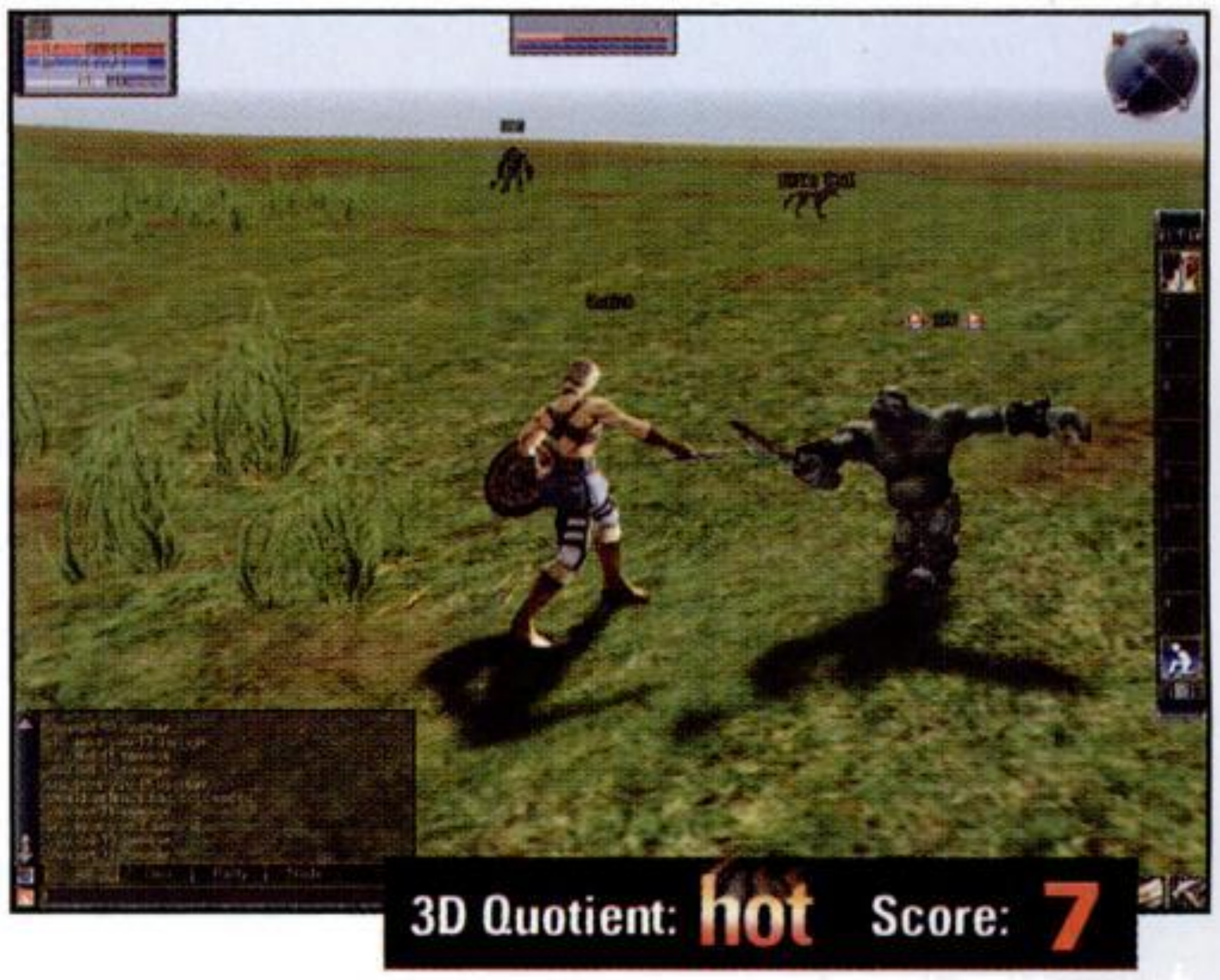
**Publisher: Eidos, www.hitmancontracts.com**

Don't tell our therapist, but we're big fans of the *Hitman* franchise. The thrill we felt after stealthily taking out assigned targets in the flawed yet memorable *Hitman: Codename 47* and *Hitman 2: Silent Assassin* remains unparalleled. We hoped that the return of Agent 47 would satisfy our craving for stealthy shenanigans, but much to the dismay of our inner assassin, this *Hitman* fails to deliver the killer blow. The biggest problem is that *Contracts* doesn't improve upon the formula established in earlier titles in any meaningful way. From the graphics engine to the game mechanics, every aspect of the experience looks and feels as though it's been lifted straight from the last game. We were able to wring *some* enjoyable moments out of *Hitman: Contracts, though.* Fans of the franchise will ease into the game like a pair of old sneakers, albeit a pair they've already outgrown.

## Lineage II

**Publisher: NCsoft, www.lineage2.com**

*With Lineage II,* developer NCSoft follows the standard point-and-click, hack-and-slash formula of other MMORPGs like *Everquest* and *Dark Age of Camelot* so religiously that although the game is hard to fault, it feels completely uninspired. In fact, *Lineage II's* only glaring flaw is a lack of innovation. Early on, players find themselves settling into the classic MMORPG treadmill: fight monsters, get experience, get gold, level up, buy equipment. Repeat. It's a tried-and-true formula, but it feels a little long in the tooth. Persistent players are promised a deeper and richer role-playing experience, where they can upgrade their class, craft items, form clans, siege castles, and even raise their own dragon. But when you're only at level 8 and you've just killed your five-thousandth orc, you'll wonder if it's even worth it.



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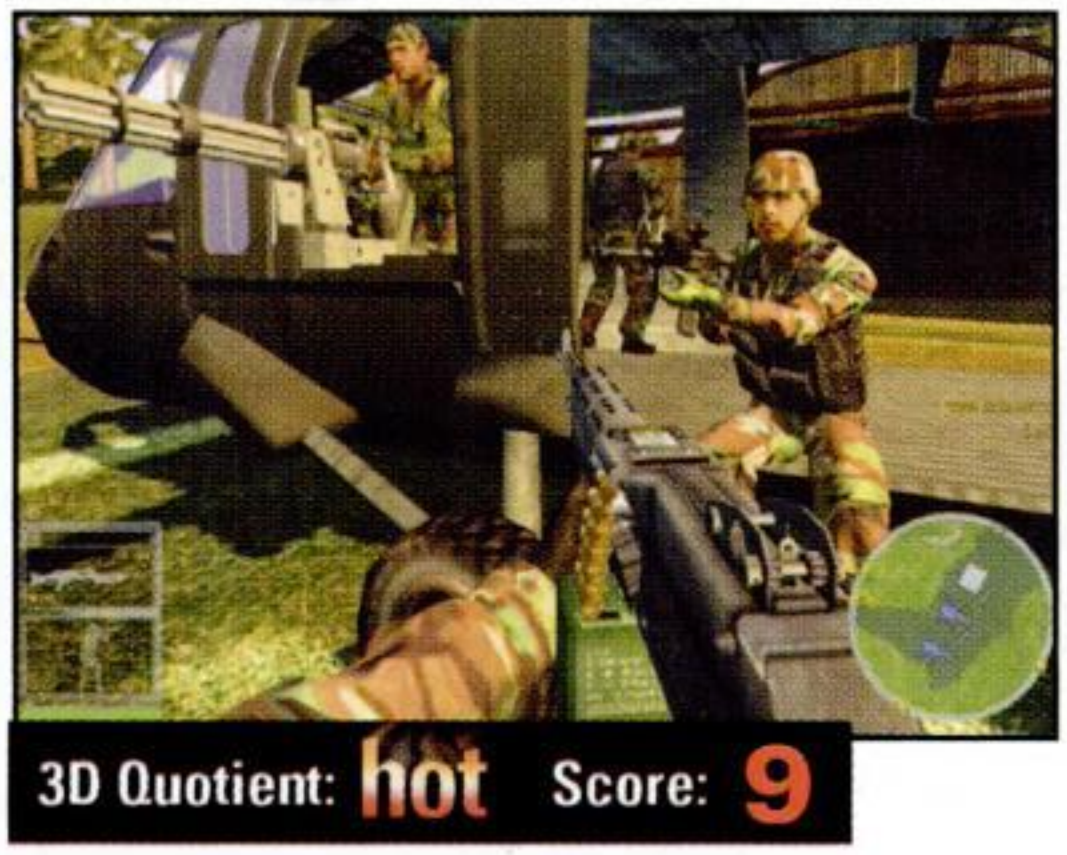

## Joint Operations: Typhoon Rising

**Publisher: Novalogic, www.jointopsthegame.com**

In *Joint Operations: Typhoon Rising,* Indonesian militants fight for sovereignty while international peacekeeping forces attempt to maintain stability. This overly political premise doesn't intrude on the fun, though—behind the vague politics and Vietnam comparisons lies an extremely strong *Battlefield*-style tactical FPS. Massive, frenetic, balls-to-the-wall battles are the focus in *Joint Operations.* The largest maps cover 50 square kilometers, and can accommodate up to 150 players. With a balanced team that works effectively together, these giant battlefields make for some hair-raising skirmishes.

Even a couple kilometers is a long distance to travel on foot. Thankfully, several land, sea, and air vehicles are available to get you to the action fast. Driving and piloting the various craft is surprisingly easy, using a simplified control scheme rather than the tricky "realistic" controls of the *Battlefield* games.

ZT recommends Microsoft® Windows® XP

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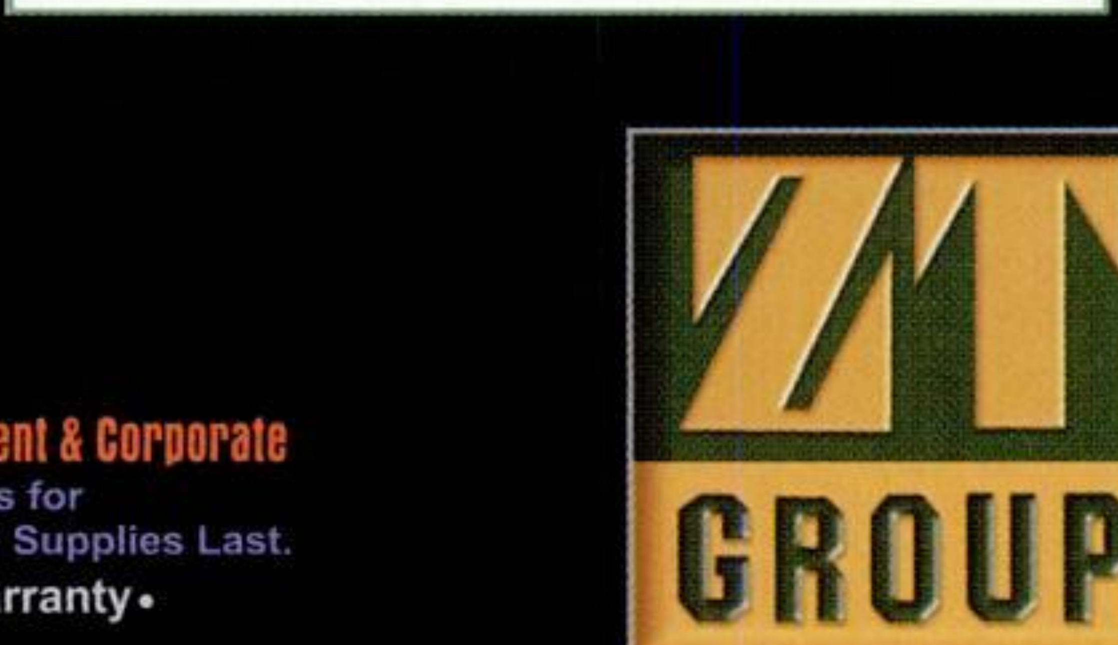

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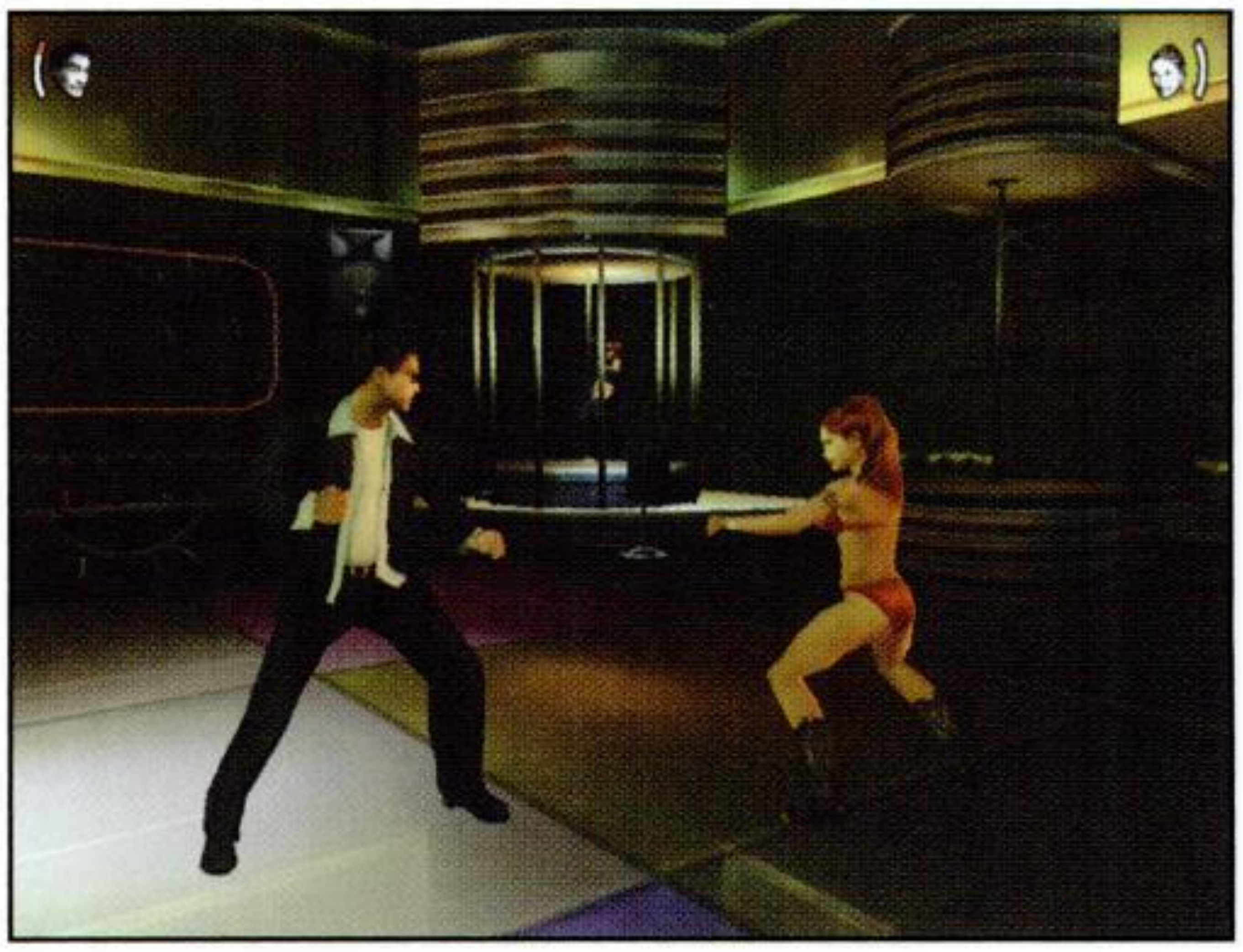
## True Crime: Streets of L.A.

**Publisher: Activision, www.truecrimeLA.com**

Regardless of how you feel about *Grand Theft Auto III*, is it was a bona fide success, both in terms of commercial sales and critical praise. So it wasn't a big surprise to anyone when a gaggle of imitators and copycats soon began to appear on store shelves. *True Crime: Streets of L.A.* is the latest of these wannabes, but those expecting an entertaining *GTA*-esque romp had better look elsewhere.

The fact is, this game fails to deliver the goods. The game tries to do too much of everything and succeeds in doing almost none of it right. The gameplay, which is divided amongst shooting, driving, and fighting, is uninspired and riddled with problems. The shooting portion is ruined by unforgiving controls and a wonky camera, the driving portion suffers from poor vehicle physics, and the hand-to-hand combat quickly degenerates into mindless button-mashing. The missions themselves are poorly scripted and often result in ridiculous outcomes. 'Nuff said.

**3D Quotient: warm Score: 4**



# October

## The Suffering

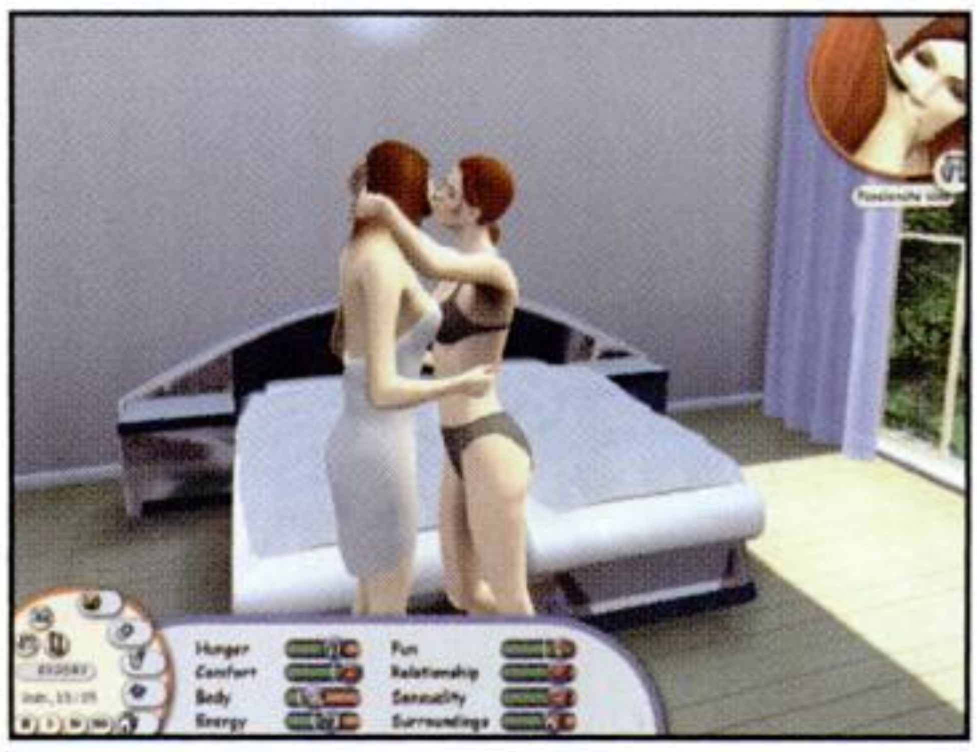
**Publisher: Midway, www.thesuffering.midway.com**

*The Suffering* aims to deliver action and dread at the same time, and it succeeds, striking a harsh but skillful balance between suspense and action, between slasher fu and grim suggestion. Despite console-spawned graphics and occasional repetitiveness, it delivers the kind of horror, revulsion, and intense action that Rockstar's craven *Manhunt* promised but failed to deliver.

**3D Quotient: warm Score: 8**

## Singles

**Publisher: Eidos, www.eidos.com**



**3D Quotient: warm Score: 3**

If you can recall the crushing disappointment of hatching your first batch of Sea Monkeys, you'll have a pretty good idea of the experience offered by *Singles* ("Flirt up your life!"). The objective of *Singles* is simple. Through an interminable campaign of mouse clicking, you attempt to help two roommates overcome the common-sense barrier of not sleeping together until they can no longer help themselves, at which point they jump into bed for an embarrassing twenty-two second grapple beneath the comforter.

We'll concede that visually-speaking, *Singles* looks pretty good. Your environment and furnishings are three-dimensional, and you're free to pan around, adjust the viewing angle, and zoom in and out (no pun intended). But so what. If sex were this boring, we'd choose abstinence.

## Missing: Since January

**Publisher: The Adventure Company, www.theadventurecompany.com**

Previously released in Europe by Ubisoft as *In Memoriam*, *Missing* is an interesting and novel take on an established formula that ultimately falls short. The premise of *Missing* revolves around the disappearance of a journalist and his partner at the hands of a serial killer. Named The Phoenix, the murderer releases a CD-ROM that contains clues to the couple's whereabouts. Gamers are challenged to unlock the mystery by solving a series of puzzles using their wits, Internet search engines, and their own email accounts. Internet access is a game requirement and is seamlessly integrated into the experience. Unfortunately, the majority of the puzzles are overly vague and teeth-gratingly difficult. Even more disappointing is the game's lackluster, anti-climactic ending.

**3D Quotient: warm Score: 6**

If you want to reach dizzying heights, then give it to me.

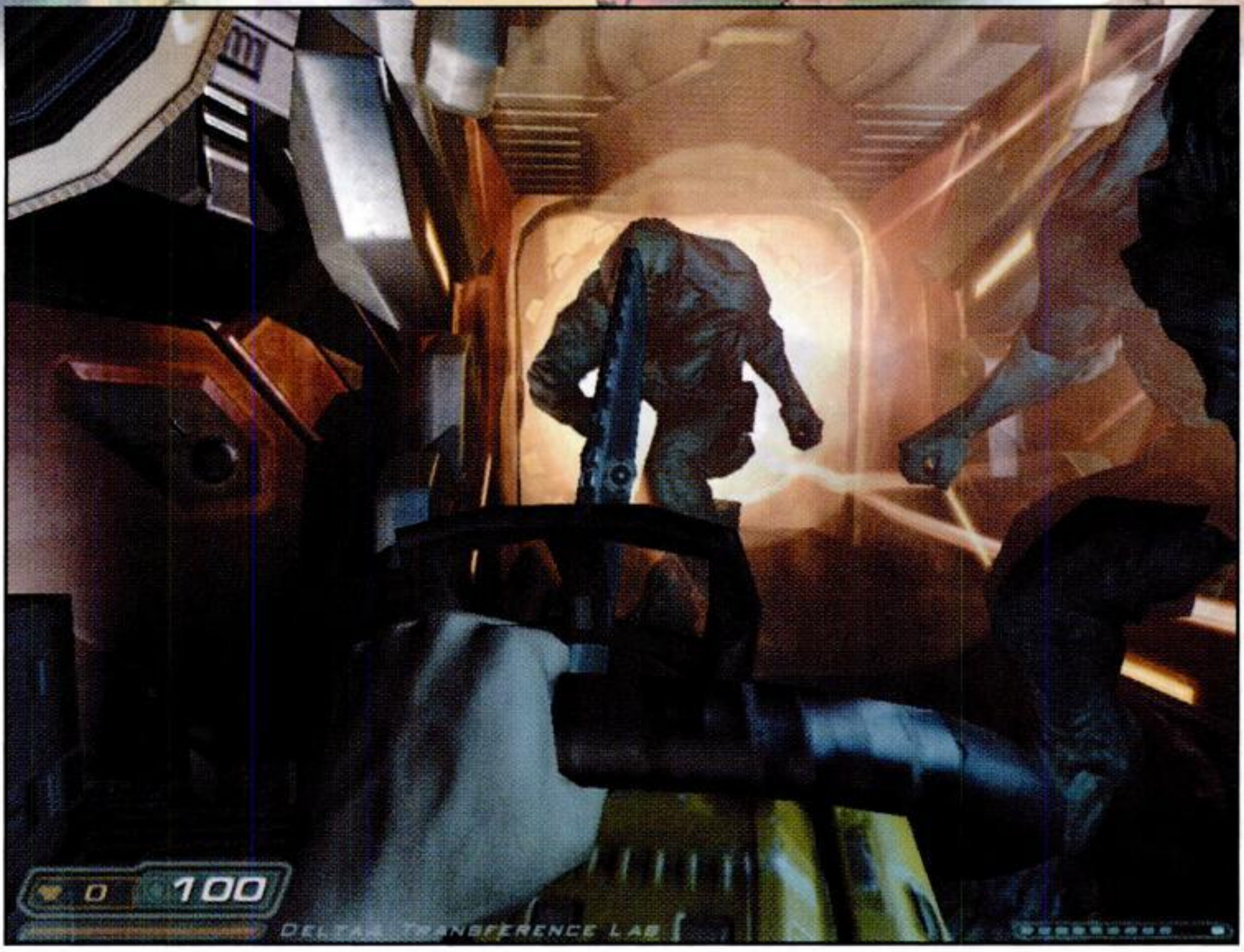
# Doom 3

**Publisher: Activision, www.doom3.com**

One week prior to *Doom 3's* release, it felt like the night before Christmas at the Maximum PC offices. We all upgraded our rigs with beefier processors and next-generation videocards. And with everything benchmarked and thoroughly broken in, we went to sleep each night with visions of imps and cacodemons dancing in our heads.

Once the game arrived and we began playing, we were overwhelmed by mixed emotions. Indeed, *Doom 3* looks absolutely amazing, and we're pleased to see a game actually justify the immense amount of time we've spent upgrading our systems. On the other hand, while it's extremely scary at times, the gameplay follows a basic formula that consists of wandering through dark hallways while enemies teleport into the room when you trigger invisible switches. This pattern repeats itself throughout the game's 20-odd hours of gameplay, and because the enemies use the same attack methods, the only thing that really changes is the teleport locations. This "surprise!" formula goes from surprising to annoying real quick.

Despite its repetitive nature, combat still feels satisfying and, like the game itself, is easily the most intense action we've experienced on a PC in a long time. The sensation of the weapons combined with almost-nonstop action and 5.1 surround sound puts you right in the middle of a scarily realistic environment. And although you fight the same enemies over and over, the tension persists as baddies leap out at you from behind closed doors, claw at your face, and scream and writhe as you send them back to hell.



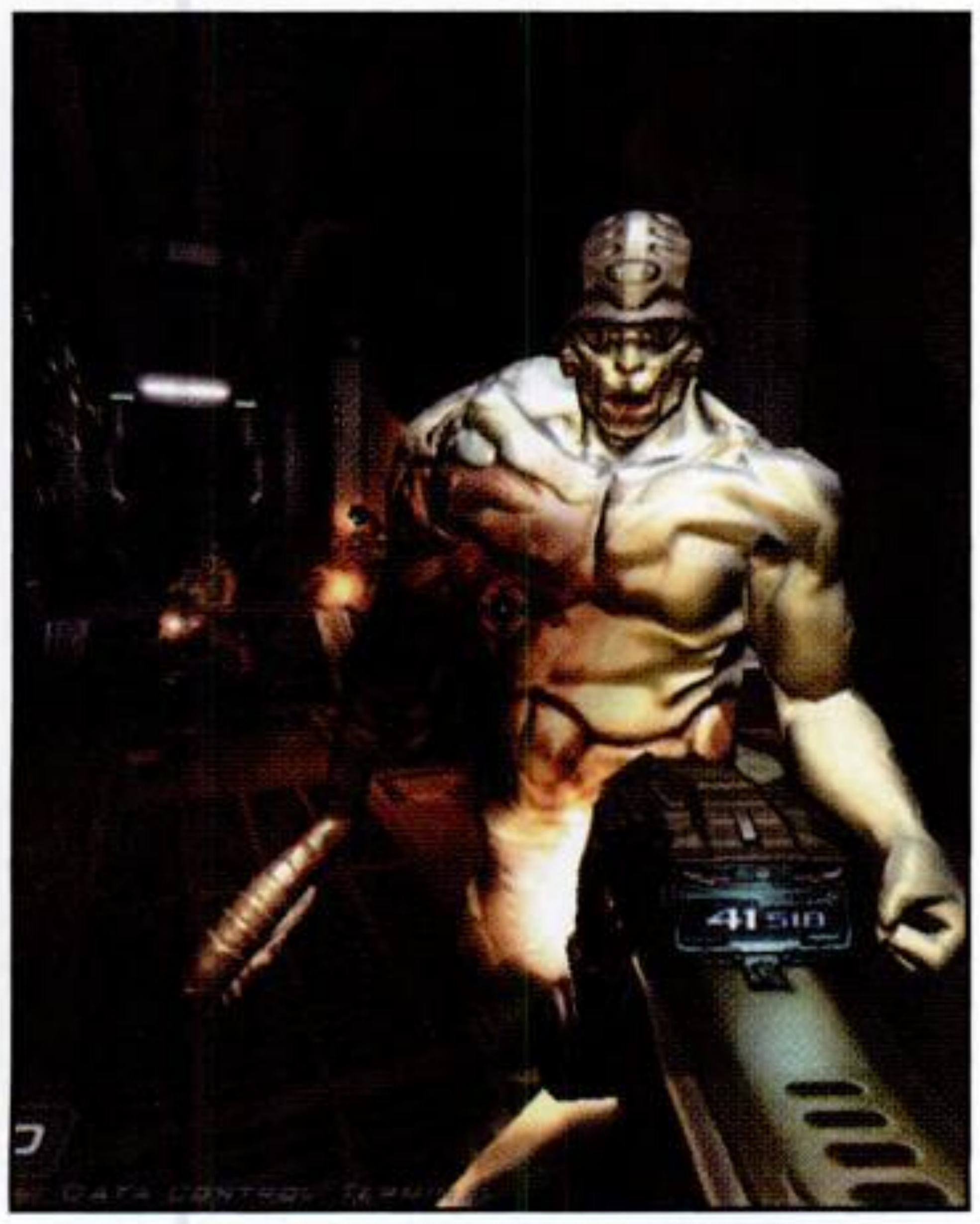
**Doom 3 sure looks pretty, unfortunately the AI is pretty basic—monsters use the same attack methods all the time.**

There's a story in the game, but unfortunately you're forced to read about it in e-mails you find on dead bodies, which consequently brings the game's frantic pace to a crashing halt. While it's nice to see an id game with a story, we can't help but deem these messages a pretty lazy way to drive a plot.

Multiplayer is also included, but out of the box, it's a half-baked affair. Matches are limited to four players per map, and only five maps are included. As of this writing, we've encountered several bugs in the process of joining online servers. But when we could connect, we had a blast. The action feels as fast, furious, and nail-biting as it did back in the old-school days of original *Doom.*

And ultimately, despite all its flaws, we simply could not stop playing the single-player campaign: If it weren't for our sore necks and frazzled nerves, we would have finished it in our first sitting. *Doom 3* is clearly the best single-player game id has ever made. It's just too bad the game doesn't bring as many new ideas to the FPS genre as it does to the world of 3D rendering.

**3D Quotient: smokin' Score: 8**



**Location-specific damage means enemies react convincingly when struck.**

## Doom 3 Tweaking Tips

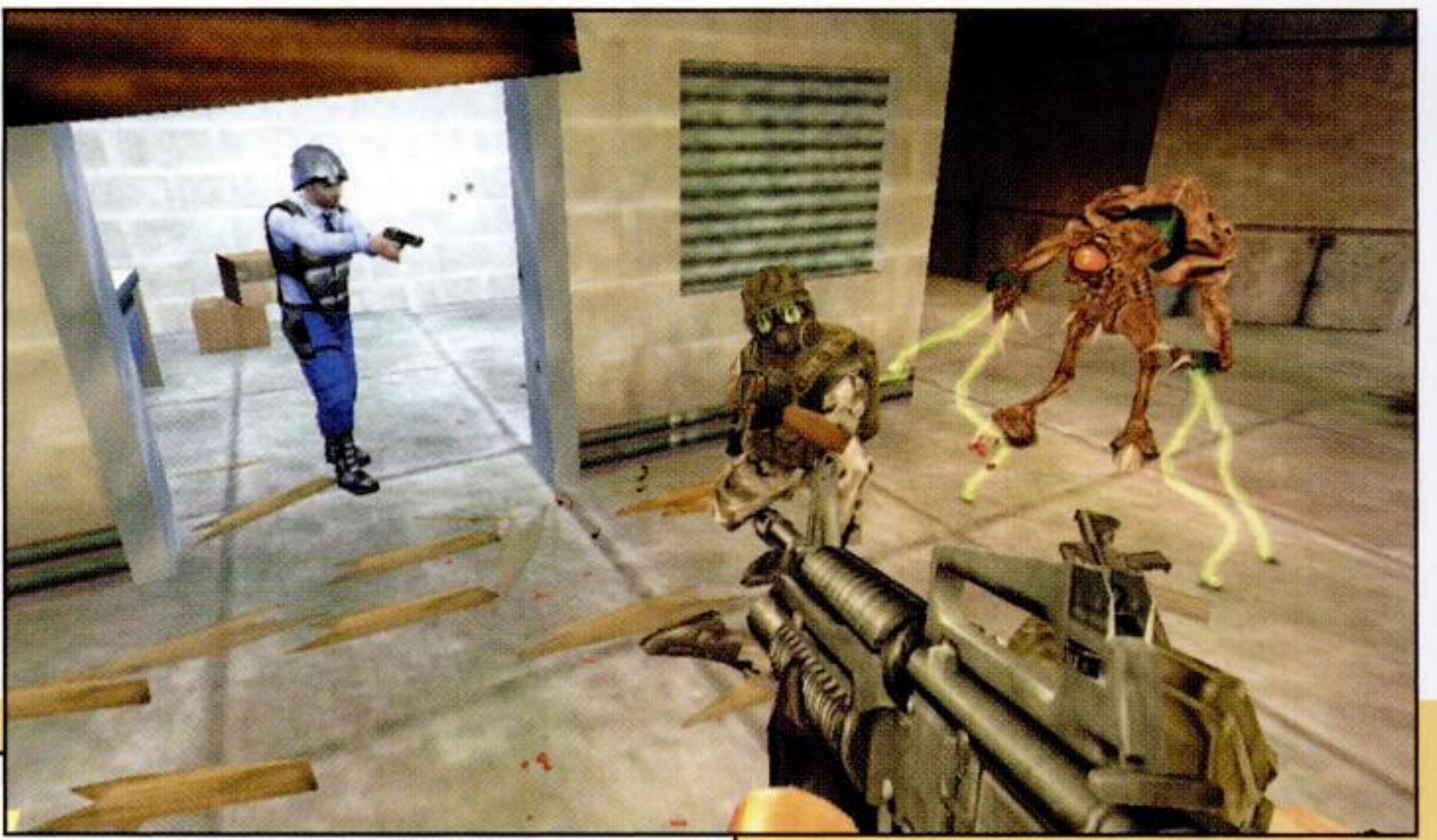
***Maximum PC presents 7 quick tips for maximum performance***

- Enable triple buffering in the OpenGL control panel of your videocard's display properties. This will give you better visual quality with no loss of frame rate.
- Fix the game's nasty visual tearing and corruption by enabling VSync in the "advanced" video options. Even if you have it enabled in your videocard settings, the game can overrule this setting, so it must be set in-game.
- If you are running dual displays, killing the second monitor when firing up *Doom 3* will drastically increase your frame rates.
- Download the latest drivers for your videocard. As an example, Lab testing has shown frame rate improvements ranging from 10 to 20 percent using the beta 4.9 Catalyst drivers.
- Open the console (CTRL+ALT+~) and type "r_gamma 1.3". This cranks up the gamma a smidge, making the game appear crisper and a touch brighter, but still keeps it dark enough to remain consistent with how it's supposed to look.
- To run the included *Doom 3* benchmark, open the console and type "timedemo demo1". Be sure to run it twice, ignoring the first score.
- To enable the frame counter, open the console and type "com_showfps 1".

# The Top Ten 3D Games of All Time

## *Maximum PC's* editors engaged in a no-holds-barred steel-cage wrestling match to bring you this definitive list of the best 3D games ever

Like the first time we saw a lightsaber in *Star Wars*, there are equally poignant moments from games that fuse into our memory banks. Certain rare titles, such as *Half-Life*, are chock full of them. More often the case, a game may serve up just one or two gaming epiphanies—if we're lucky. These moments can change a ho-hum game into a classic in a heartbeat, and help to raise the bar future games are judged against. The following ten titles represent the most influential, fun—and unforgettable—3D games made to date. ■



**By delivering more than its share of unforgettable moments, *Half-Life* became an instant 3D gaming classic.**

**1. Quake:** *The* game that really drove home the need for 3D video hardware, and the forefather of too many great games to list here. Who can forget the first time they saw the Shambler lumbering towards them.

**2. Half-Life:** This game still represents the high water mark in the FPS genre for delivering *all* the goods—amazing 3D graphics, an epic story, and a laundry list of indelible moments.

**3. TIE Fighter:** Way ahead of its time, this game managed to do a lot with the relatively paltry PC horsepower available at the time—and it was so good to be a bad guy in the *Star Wars* universe.

**4. Tomb Raider:** Would Lara Croft be the mass-media icon she is today without those 3D polygons? We doubt it. And the T-Rex encounter shown below is one of gaming's most epic moments.

**5. Unreal:** Based one the first game engine to give id some serious competition, and the opening scene with the crashed ship and the waterfall still evokes a sense of awe; as does your first meeting with the Skaarj.

**6. Jedi Knight: Dark Forces II:** A huge, utterly *Star Wars* 3D game world with awesome Force power-effects and a stunning use of 3D audio.

**7. Call of Duty/Medal of Honor: Allied Assault:** Yes, we have a tie here between two of the most purely visceral, ear-numbing games we've ever played. COD's siege of Stalingrad opening sequence is boot-shakingly amazing—as is *MOHAA's* Omaha Beach landing.

**8. Deus Ex:** Perhaps the most successful dual-genre game—RPG and FPS—of all time, this one was gorgeous, and extremely open-ended, too.

**9. Total Annihilation:** The first RTS with 3D units, *Total Annihilation* was also the first to give Westwood and Blizzard some real competition in the genre. It scored another first in incorporating downloadable content after its release. Finally, it was just plain outrageously *fun*.

**10. MechWarrior 2:** This game spawned more 3D-specific versions than any other 3D game we can recall, and it succeeded at making us feel like we were driving a 100-ton hunk of destruction.

## Honorable Mention

**These games deserve note for coming oh-so-close to making our Top Ten:**

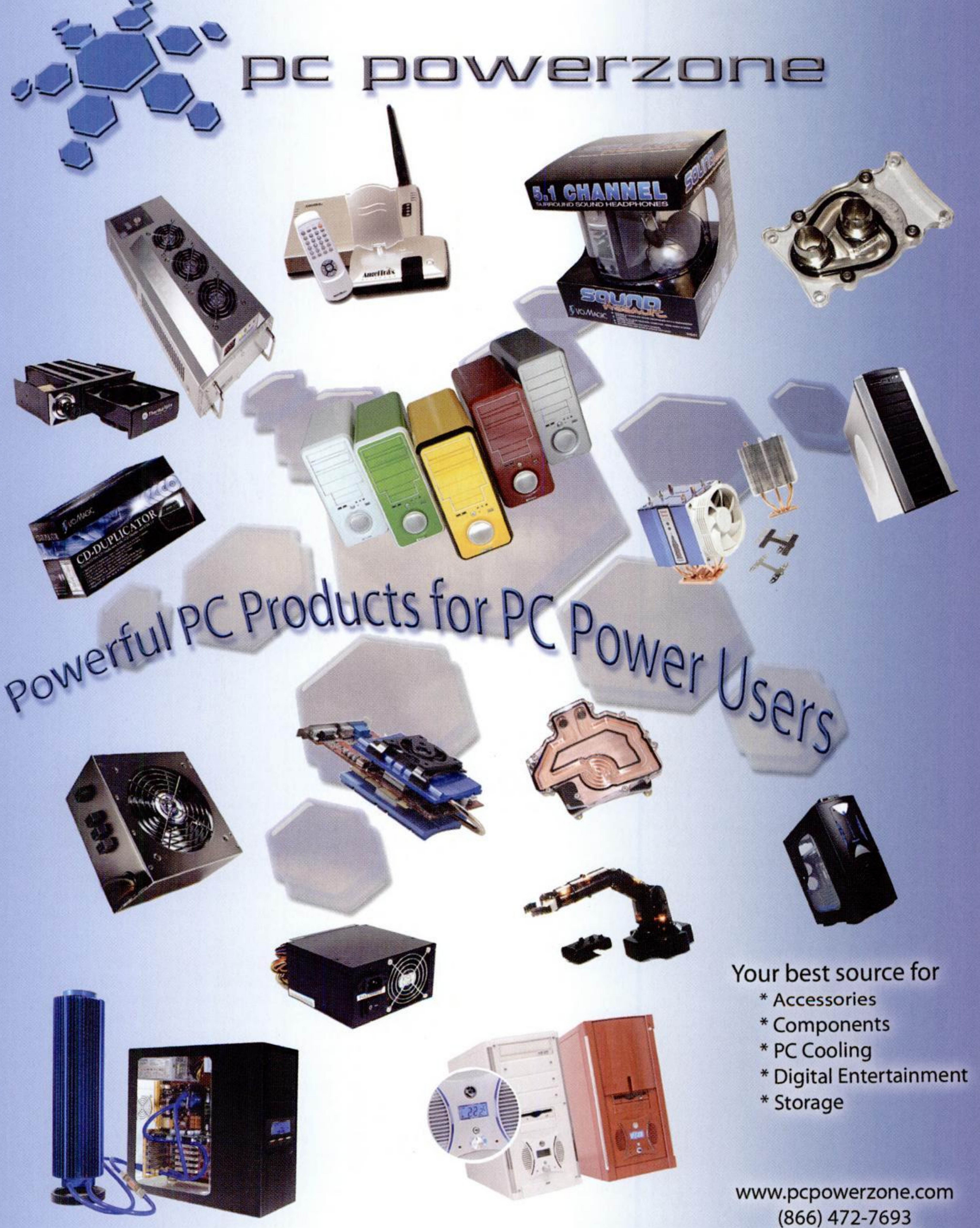
**Far Cry:** Gorgeous, huge outdoor levels replete with luscious vegetation, spectacular water effects, and solid AI.

**Duke Nukem 3D:** Okay, maybe it's "2.5D," but this game delivered more raw entertainment value than any other game on this list.

**Knights of the Old Republic:** The best 3D RPG—and *Star Wars*-licensed game—we've played yet.

**Grim Fandango:** One of the first—and most visually unique—3D adventure games.

**Doom 3:** The game play may not innovate, but the engine represents the current state of the art for the industry.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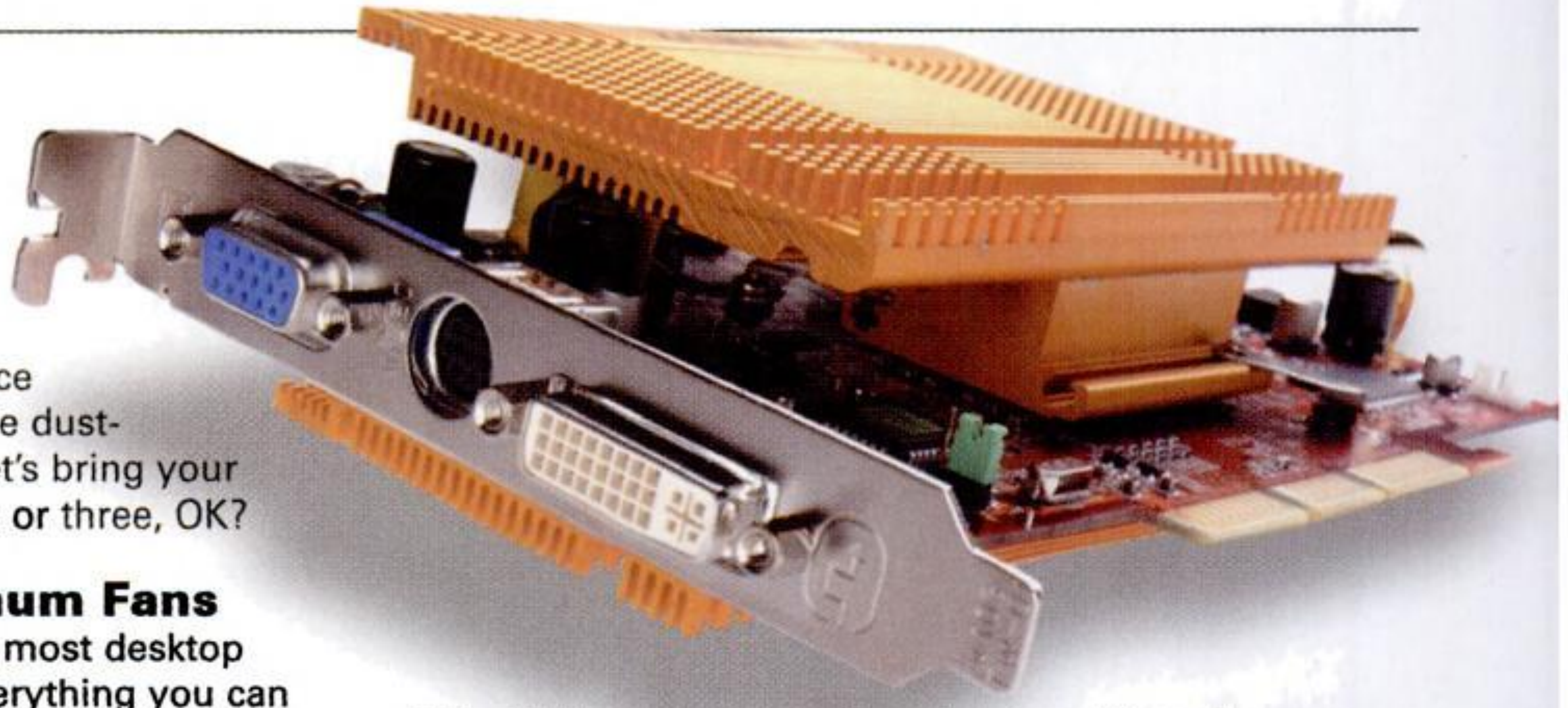
# How To... A step-by-step guide to tweaking your PC Experience

# QUIET YOUR PC

## Constant fan hum can slowly drive you insane. But silencing your noisy PC is easy—if you follow our simple guide

A modern PC is a noisy beast, what with the constant whirring, clicking, and whooshing it typically emits. But fans are vital for cooling hot components, and there's not much you can do to silence loud hard drives. Lucky for you, we're dusting off a few of our favorite tricks. Let's bring your computer's noise level down a notch or three, OK?



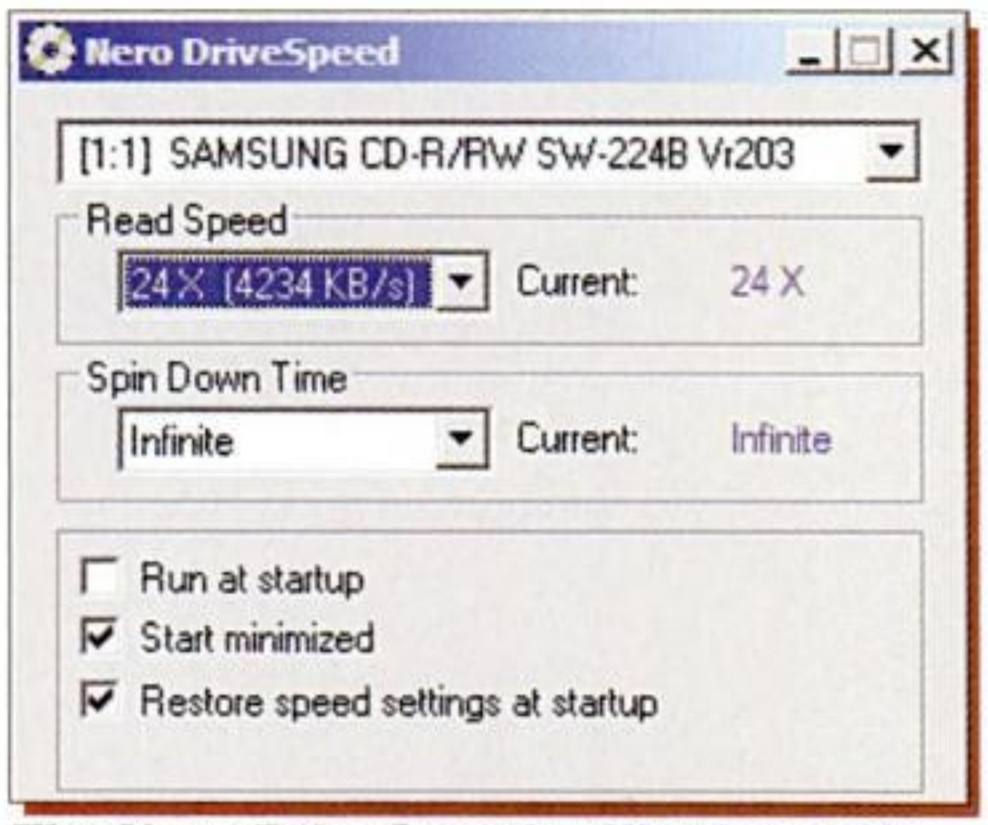
**This ATI board sports the silent cooling of a supersized Zalman heatsink/heat pipe combo.**

### Maximum Cooling, Minimum Fans

Fans are the noisiest components in most desktop systems, so it makes sense to do everything you can to minimize the sound they make. Whether you replace your loud fans with quieter models or opt for an entirely different cooling solution, it's important to ensure that the heat generated by your hardware is effectively moved to outside the case.

The first thing you can do to combat fan noise is pare down your airflow scheme to the bare minimum. Disconnect all the fans in your system except for the CPU and videocard fans. Close the case and restart the PC. Now you need to check the temperature in different areas of your case. You can use an application like Motherboard Monitor **(mbm.livewiredev.com)** to keep an eye on your CPU temperature.

After you've run the machine for 15 or 20 minutes, power it down, open the case, and check the temperature on the videocard, CPU, and hard drives by touching them. It's OK for components to be warm, but they shouldn't be hot. Re-enable the fans you previously disconnected, one at a time, until you find a satisfactory balance of noise and cooling.



Nero DriveSpeed

[1:1] SAMSUNG CD-R/RW SW-224B Vr203

Read Speed

24 X (4234 KB/s) Current: 24 X

Spin Down Time

Infinite Current: Infinite

☐ Run at startup

☑ Start minimized

☑ Restore speed settings at startup

**The Nero DriveSpeed utility lets you slow down your speedy optical drives, keeping them quieter and cooler.**

Remember that larger fans turn slower—thus making less noise—while moving the same amount of air. If your PC has mounts for 120mm fans, use them instead of louder, faster 80mm fans.

### Don't Be a Fan Boy

If you really want to maximize the cooling you get per fan, you can replace the fans built into some of your components. Today's videocards, for example, are equipped with fans that are frequently louder and more powerful than they need to be, especially if you're willing to sacrifice a few frames per second.

The Zalman ZM801-HP uses a pair of massive heatsinks and a heat pipe to passively cool your videocard's GPU. Although you can use the Zalman heat pipe without a fan, it's a good idea to pair it with a quiet, low-speed fan to get air moving over it. If you'd rather stay completely fanless, you can use *Powerstrip* to underclock your videocard, which will keep the temperatures down.

Several companies are also developing quiet and fan-free power supplies. After testing many different versions of PC Power and Cooling's Silencer (www.pcpowerandcooling.com), we're convinced it's the quietest standard power supply, but it still generates some fan noise. Enter Antec's Phantom, a totally fanless and therefore silent power supply. Instead of relying on a fan to exhaust warm air, the Phantom uses a large heatsink that protrudes from the back of your PC.

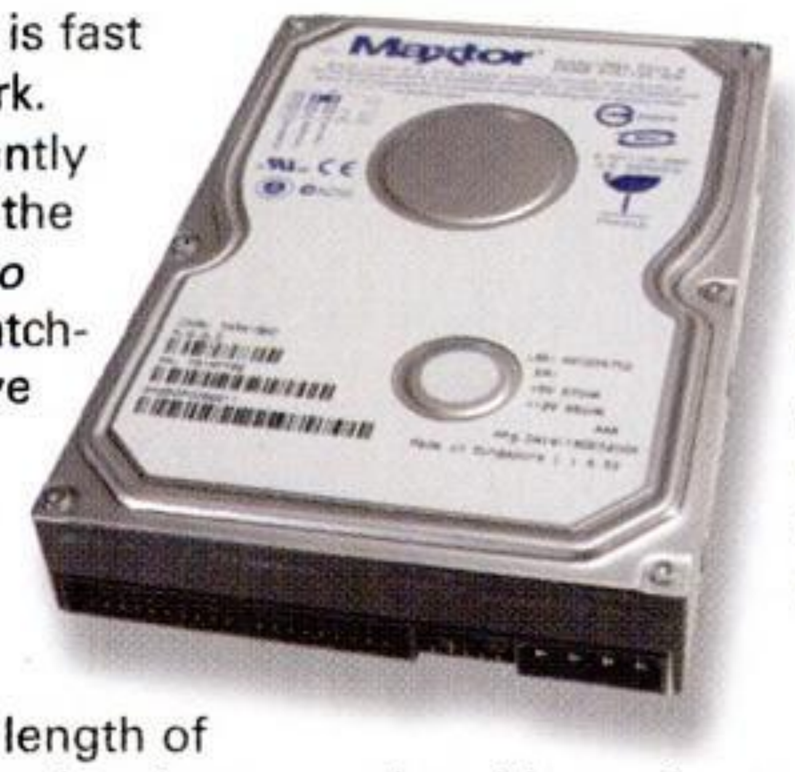
## Slow Down Your Drives

Once you have a handle on your fan noise problem, you can turn your attention to the next noisiest parts in your PC—hard drives and optical drives. In exchange for a small performance hit, you can use utilities and firmware updates to silence your drives.

Hard drives are first. If your drive is made by Hitachi, IBM, or Maxtor, your manufacturer provides easy-to-use tools that let you slow seek times and stop your loud drive from clicking. Look for *amset* at www.maxtor.com, or *Feature Tool* at www.hgst.com. Unfortunately, we don't know how to enable quiet operation modes on drives from other manufacturers.

If you have more than one hard drive, it might be worth upgrading to a single larger drive. As a general rule, two drives are louder than a single drive. The 250GB Maxtor DiamondMax Plus 10 is fast enough for most desktop work.

Optical drives are significantly easier to quiet, but you need the right software. Using the *Nero DriveSpeed* utility, you can ratchet your noisy 52x CD-RW drive down to a silent 32x speed. *DriveSpeed* is installed with Nero by default. Once the app is configured for your drive, you can adjust both the maximum speed and the length of time the drive waits before it spins down after a data access. Don't worry, when you feel a need for speed, you can use *DriveSpeed* to crank the drive back up to full throttle.



**The Maxtor DiamondMax Plus 10 line of hard drives combines 7200rpm performance with whisper-quiet emissions. If you're serious about silence, this is the hard drive to buy.**

## Soundproofing and Filters

The only thing left to do is add some sort of sound-absorbing material to the inside of your case, and apply porous filters over all the intakes and outtakes of your PC. Adding filters, especially to the fans on the front and top of your case, can prevent much internal sound from escaping.

Several types of sound-absorbing materials are available for PCs today—Dynamat (www.dynamat.com) and Magic Fleece (www.frozencpu.com) are among the most popular. Dynamat does a great job absorbing noise and is thin, but if your case has the extra room, nothing beats the thicker absorbing action of Magic Fleece.

Both materials are easy to apply. First, look at the space in your case to determine how much sound deadener you can fit in different locations. We recommend applying it to the sides and top of your case, and whatever areas of the front are accessible.

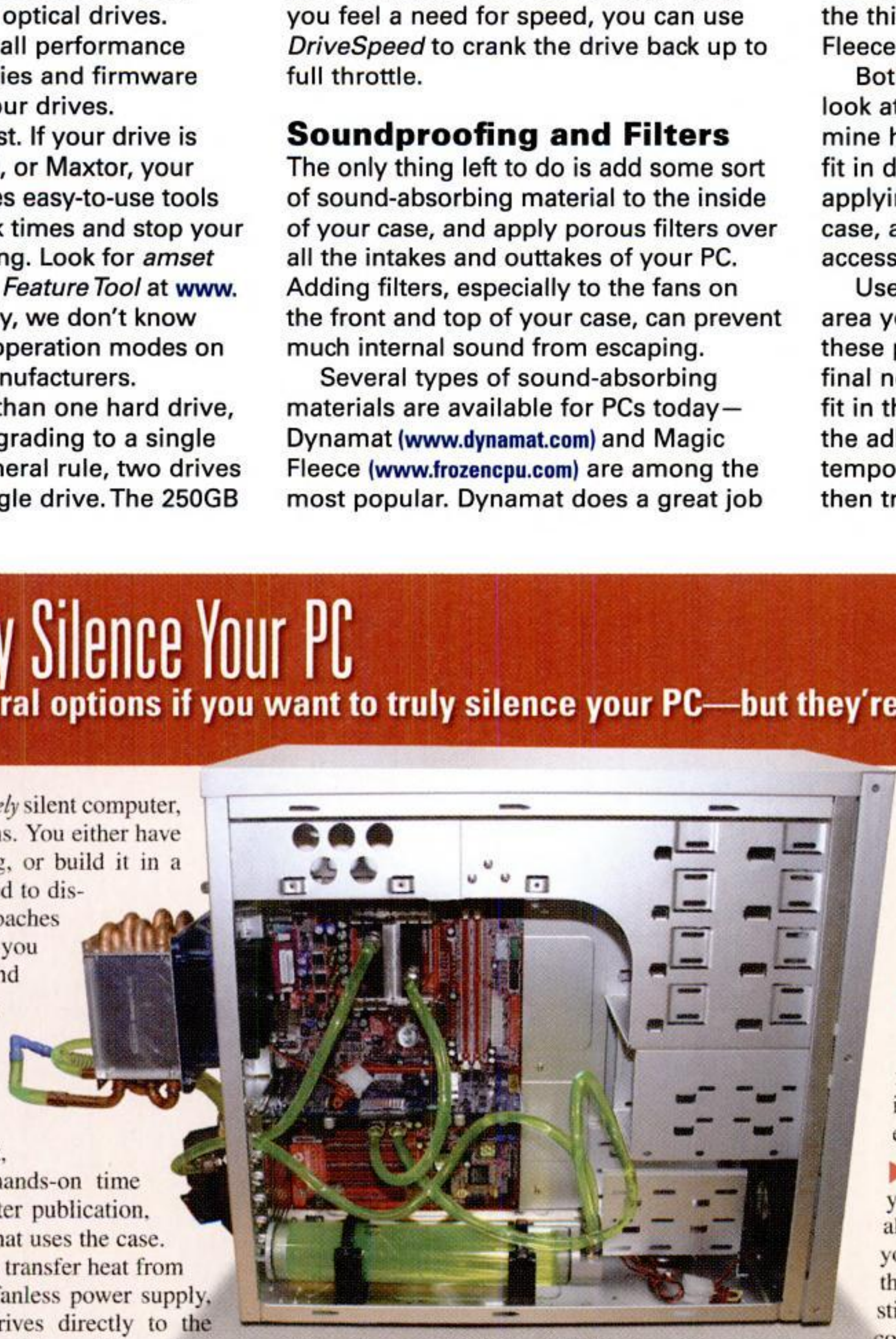
Use a newspaper to cut patterns of the area you want to soundproof, then use these patterns to cut the material. One final note: Make sure your pieces actually fit in the desired area before you remove the adhesive. Use double-sided tape to temporarily stick the pieces in place, and then try closing the PC.

## Completely Silence Your PC

### You have several options if you want to truly silence your PC—but they're not for the faint of heart

If you want a *completely* silent computer, you have two options. You either have to water-cool your rig, or build it in a case expressly intended to dissipate heat. Both approaches have downsides, but if you must have peace and quiet, both techniques deliver.

We haven't put a Zalman TNN500A case through its paces in our lab yet, but we have spent hands-on time with a system our sister publication, *PC Gamer*, reviewed that uses the case. By using heat pipes to transfer heat from the CPU, videocard, fanless power supply, memory, and hard drives directly to the exterior of the case, and by adding radiator fins to the outside of the case, Zalman essentially turns the entire case into a giant passive cooler. It's extremely cool, and super-quiet. The downside is that this level of cooling costs upwards of $1,400. Get more info at www.zalman.co.kr.



**A water-cooled rig eliminates the need for fans and makes your PC quiet as a church mouse, but beware of leaks!**

If you'd rather make your existing case silent, we recommend adding a water-cooling kit. Our current favorite is the Innovatek InnovaSET3 (www.highspeedpc.com). It includes a reservoir, radiator assembly, silent pump, CPU block, and all the tubing and fittings you'll need to get your coolant flowing. Cooling blocks are available for nearly every CPU and videocard.

When you configure a water-cooled rig, there are a few things to remember:

- Always fully assemble and fill your kit outside your system before you actually install it. It's better to find out about a leaky reservoir before it spews water all over your $500 videocard.
- Use distilled water and a conditioner in your rig. Tap water often contains minerals that can clog your hoses and corrode your pump. Water conditioner will keep the liquid in your system from getting stinky. Plus it's a cool-looking neon-green color.
- For the first few weeks of operation, make sure you frequently check the water level in your reservoir. The last thing you want is for the water to evaporate, leaving your precious PC exposed to the elements with no thermal protection whatsoever.
- If you have hot 10,000rpm hard drives, consider enclosing them in cooling thermal jackets. The water-cooled jackets will lower the drives' operating temperature, insulate them from sound, and extend their life span. ■

# How To... A step-by-step guide to tweaking your PC Experience

# SCULPT YOUR SYSTEM'S AIRFLOW SCHEME

## With our handy guide, there's no need to resort to extreme measures

You've built your own dream machine, tweaking and overclocking it to perfection, but have you paid enough attention to its cooling scheme? With today's high-end PCs sporting ever-warmer hard drives, blazing-fast CPUs, and videocards that could fry an egg, a good cooling scheme is more important now than it's ever been.

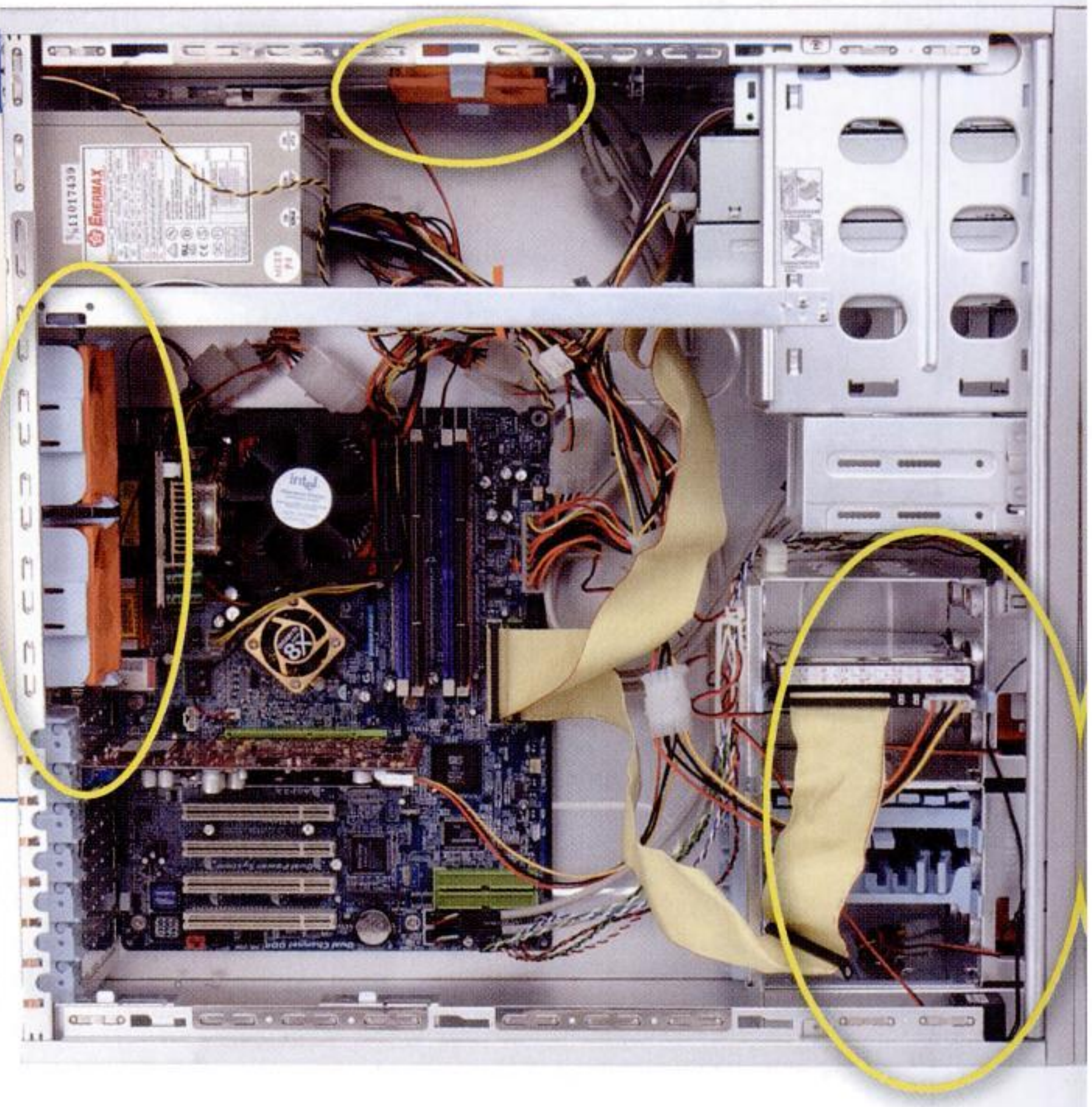
Exotic cooling techniques such as water cooling have the advantage of keeping your case temps down while remaining virtually silent. But such techniques are "exotic" for a reason: They're not for everyone. The mere thought of running water inside a PC gives most people hives. Although water cooling is perfectly safe when properly implemented, it's unnecessary for the majority of computer users and can be a hassle to maintain.

Fortunately, there's no need to resort to exotic measures to adequately cool your rig. Carefully placed, just a few fans can keep your PC plenty chilly.

First, you need to evaluate your case.

## Scoping Out the Territory

Most PC cases include fan mounts in the front of the case near the bottom and in the back of the case below the power supply. You might also have a blowhole mount on the top of your case or on the door. Open your case, and nose around inside. Look for fans that are already there, as well as spots where you can mount new fans. If you don't immediately see a fan mount at the front of the case, look between the hard-drive cage and the front bezel of the PC. Make sure you note the type of connector required by each fan (fans use either four-pin connectors that plug into the power supply or three-pin connectors that connect to the motherboard) and the sizes of the extra fan mounts (fan size can range from 4cm to 12cm diagonally, depending on location).



**Is there a How-To story you'd like to see? Want to learn how to water-cool your rig or create your own web page? No matter how off the wall, we promise to look at your idea! Keep it to less than 200 words and send it to howto@maximumpc.com.**

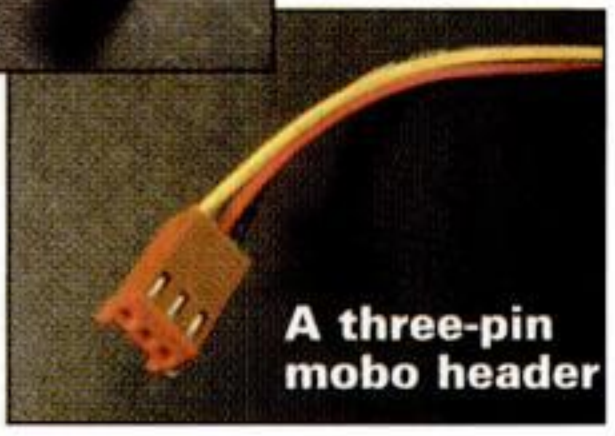
## Planning Your Attack

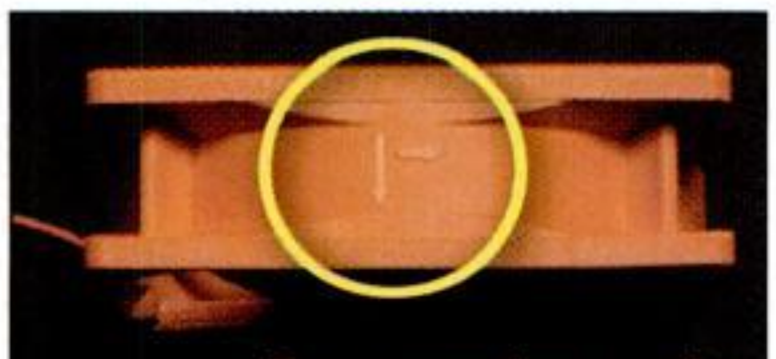
When you're designing your system's airflow, the goal should be to suck air into your case from the front-mounted fans at the bottom and blow air out the back of the case using the fan near the power supply. For best results, you'll want as much or more air coming into the case as is going out. To tell how much air your fans are moving, check the cubic feet per minute (CFM) for each fan. The CFM rating can be found on the packaging of a new fan; you can usually find the rating for a fan already in your system by searching for the model number on Google.

When purchasing a new fan, know the difference between the four-pin Molex connector and the three-pin motherboard header connector. Three-pin connector fans draw power from your motherboard. These fans report their operating speed to the mobo's BIOS, and can even be moderated by better motherboards. Four-pin connectors draw power directly from the power supply and lack the more advanced monitoring and control features of their three-pin kin.

Three-pin fans are optimal, but they're not without problems. If you try to run a fan that draws too much power from a mobo header, you can overload that header and render it nonoperational. Most motherboards have two available fan headers at most, so any additional fans you may want will have to be of the four-pin variety. Most people will need to use a combination of three- and four-pin fans in their system.

**A four-pin Molex connector**


**A three-pin mobo header**


**Pay attention to the arrows on your fan.**

## Sucking in Cool Air

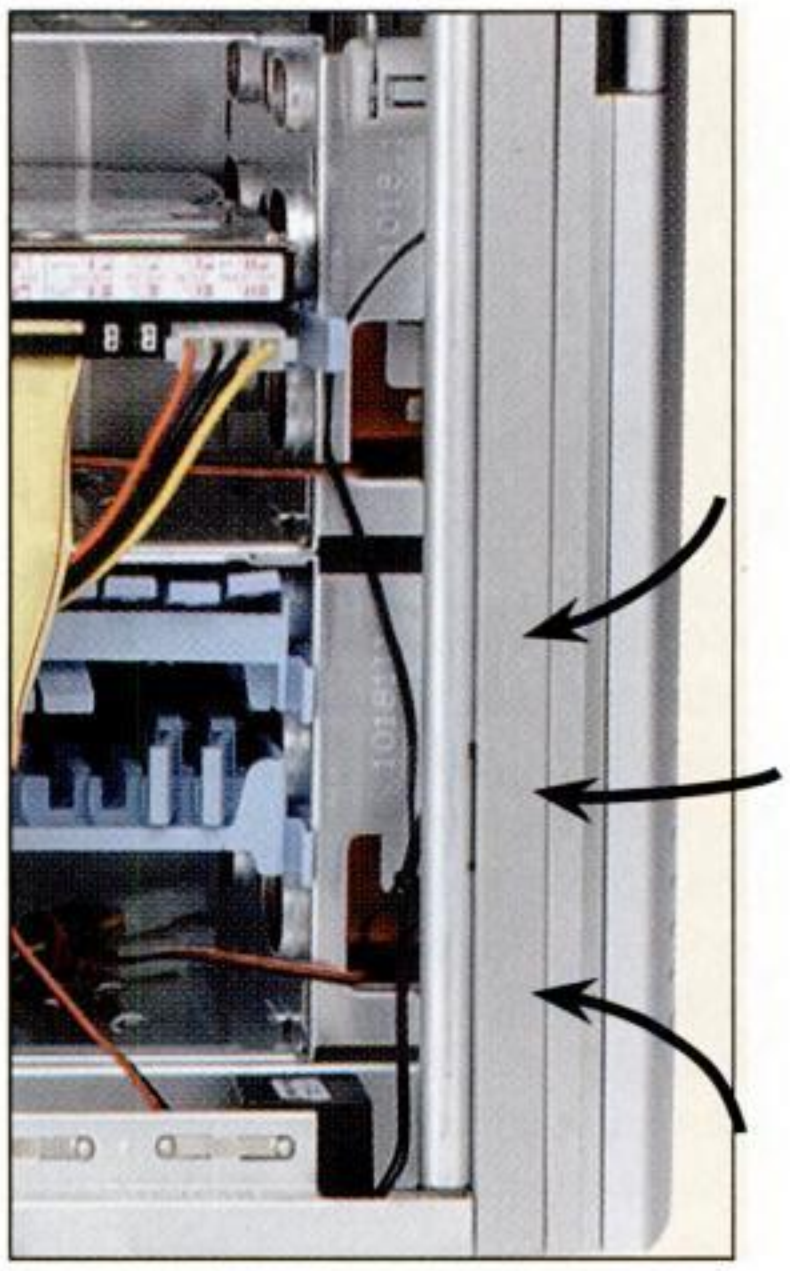
Having a fan or two sucking in air from the front of your case performs two functions: It pulls cool air into your case to get air circulating throughout, and it runs cool air over your hot hard drives in particular. How much air do you need coming into your case? If you have just a single 7,200rpm hard drive, you're probably safe with a single fan in the 25-30CFM range. If you're running more than one drive, or running a drive that's 10,000rpm or faster, you'd be wise to increase the airflow.

There are two ways to suck more air into your case: You can either use a fan that moves more air, or, if your case will accommodate them, you can use a couple lesser-capacity fans instead. Dig: One fan that moves 50CFM of air makes about 50dB of noise, while a single fan that moves about 28CFM makes just 22.1dB of noise. In other words, it's possible for two fans to move more air and yet be significantly quieter than one more potent fan.

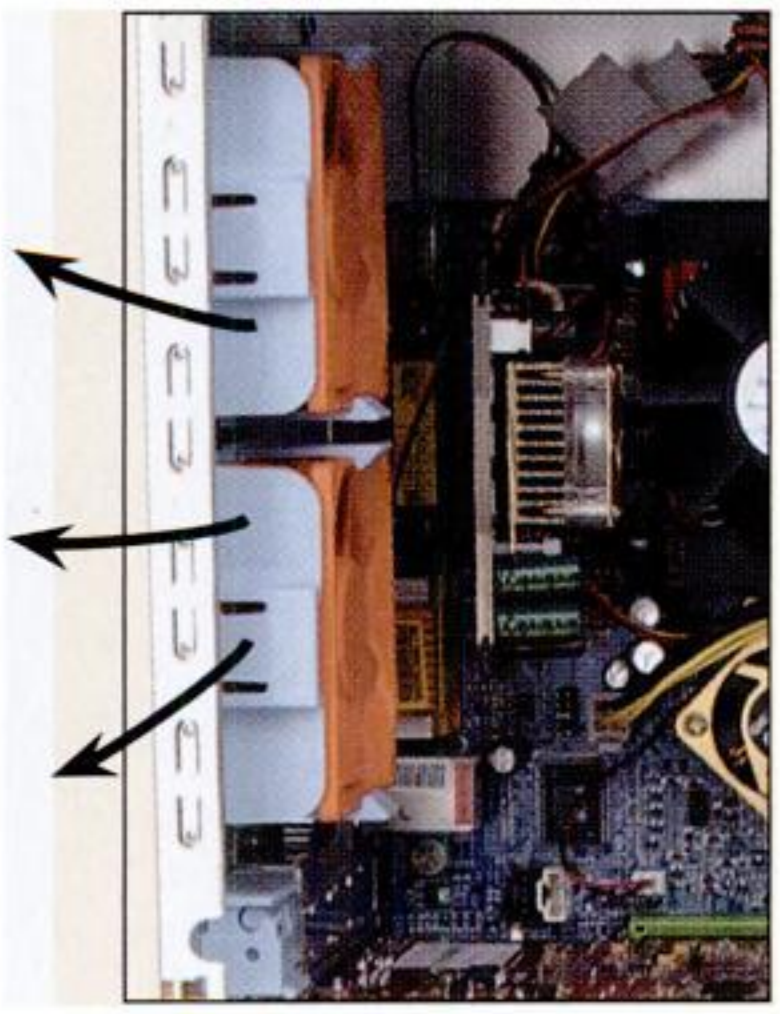
If your mobo has a fan header close to the front of the case, this is a good place to use a three-pin fan. If you set your BIOS to slow down the mobo-controlled fans when they're not needed, your system will run much quieter when idle. You might be tempted to go with fancy thermistor fans for the front of your PC, but we don't recommend them in this location. Thermistor fans adjust their speed based on the temperature of their surroundings. Unfortunately, it never gets hot enough in the front of the case for thermistor fans to crank up to speed, which could adversely affect cooling in the rest of your system.

Before mounting your fans, make sure the air will flow in the proper direction. On one side of the fan, you'll see a pair of small arrows stamped into the plastic. These arrows show both the direction the fan rotates, and the direction air will flow through the fan.

If you have lots of air moving into your case, you can move on to the next step.



## Blowing Out Hot Air



You already know that you want to blow hot air out the back of the case; in fact, your power supply fan should already be blowing air out. We're just going to give it a little help.

The best location for a powerful fan is directly beneath the power supply. That fan will suck hot air away from the CPU and memory, and will really make a difference in keeping your system cool. This is an ideal spot to use a thermistor-controlled fan because this area will always be relatively warm, and can even get downright hot.

If your system already has a fan beneath the power supply, consider using the blowhole on top of the case—usually between the optical drives and the power supply—to crank up your cooling a notch. The blowhole helps get air moving in an area that's typically neglected.

Fans mounted on your case door can make a difference with AGP cards. If you go this route, experiment with both fan settings—air sucking in and blowing out—to determine which cools your AGP cards the most. Because the fan mount's placement on the side of the case can vary, there's no hard and fast rule here.

## Winding Down

It's easy to go completely overboard with cooling. There are loads of fan buses, slot coolers, heat pipes, and other high-end cooling products that sound attractive but are completely unnecessary for non-overclocked machines. A typical user should be well taken care of with an airflow-oriented cooling scheme that's quiet enough to run all the time and powerful enough to cool a hot PC. ■

# 9 Things You Need to Know About Doom 3

## id Software's lead programmer, Robert Duffy, endures our technical interrogation

0
12
CONTAINMENT MONITORING

***Doom 3* was not only built to run on older PC hardware, it was also designed for hardware that's not even out yet.**

**1** Please share your thoughts on the latest generation of graphics technology — NV40 (GeForce 6800) vs. R420 (RADEON X800) — as it relates to *Doom 3*. For your purposes, is one technology better than the other?

**Both cards do an excellent job running *Doom 3*. Right now, the NV40 edges out the R420 in overall speed, but they are both quite capable of running *Doom 3* in High Quality with very good framerates.**

**2** How many unique render paths does *Doom 3* have? In what ways will the game look and/or perform differently with each of them, and which video cards run each path best?

**Four rendering paths are supported: NV10, NV20, R200, and ARB2. There's also an ARB path, but it doesn't support full functionality.**

**All of the rendering paths support the same basic functionality, which means that the game looks effectively the same on each card. The ARB2 path does support fragment programs, which we use for a very cool heat-shimmer effect (and some other effects), although these effects-passes are not critical to the overall look of the game.**

**The NV10 path is used for GeForce4 MX cards. The visual quality on this card is good, although in some cases we have to downsize certain classes of textures to get texture-memory usage down. This path is a five-pass path to see the game as it was intended. We also see some precision issues in some cases, although this typically just produces a few artifacts and is not very noticeable.**

**The NV20 path is used for GeForce3 and GeForce4 cards. The quality level on this path is very good and we are down to two passes overall (three passes when a light texture is not monochrome) for full functionality.**

**The R200 path is used for ATI 8500 and ATI 9000 GPUs. The R200 path is single-pass overall for full functionality, and the quality level using this path is the same as the NV20. It doesn't suffer from the over-bright precision issue of the NV20.**

**The ARB2 path is considered the "total package" path. Modern cards such as NVIDIA FX GPUs and ATI R300+ GPUs fully support this path. We get everything done in one pass, and with the additional support of vertex and fragment programs, a few of the special effects look more impressive.**

**One of the things we opted to do is make sure the game looks good on all supported paths versus sacrificing a lot of visual quality just to run on older, slower cards.**

Translation: So long as you have at least a GeForce4 MX card (and remember, a GeForce4 MX is LESS powerful than a GeForce3), you should be able to play *Doom 3* with many of its bells and whistles at a decent clip.

**3** Assuming that the only difference between the two systems is their graphics interfaces, will a PCI Express–based PC run

## Lab Tests: How Doom 3 Will Run on Your PC

***Not sure your PC can pass muster for* Doom 3*? It's time to find out—we ran a battery of Lab tests to see which components pass muster and which don't***

Robert Duffy's technical answers are great and all, but this is Maximum PC, and we're never satisfied until we torture the latest hardware and software in our lab. To determine what hardware works best in *Doom 3*, we performed three rounds of tests. First, we tested videocards to see exactly how fast different generations of hardware could run *Doom 3*. To keep everything even, we tested three GeForce videocards in our Athlon FX-51 zero-point rig: an old GeForce4 MX 460, a GeForce4 Ti 4600, and a GeForce 6800 Ultra, as well as a Radeon 9800 XT. We tested the 6800 and the 9800 XT in high-quality mode at 1280x1024 with AA disabled, the 4600 board at 800x600 in medium-quality, and the MX board at a pokey 640x480 in low-quality mode.

Second, we wanted to find out how dependant Doom 3 is on CPU speed and type, so we tested it with three different CPUs: an Athlon XP, a Pentium 4, and an Athlon FX. All the CPU tests were run with a GeForce 6800 Ultra card, to isolate the variables as much as possible. The results surprised us.

Finally, we dug up three systems from our vault to see how *Doom 3* handles a variety of hardware. The three test systems—a Pentium 4 2GHz with 512MB of RAM and a GeForce3, an Athlon XP 3200 with a 1GB of RAM and a Radeon 9800 Pro 256MB, and an Athlon FX-51 with 1GB of RAM and a GeForce 6800 Ultra—represent state-of-the-art hardware from more than two years ago, one year ago, and the present, respectively.

We measured frame rates by running demo1 using the initial release of *Doom 3*. To test your own rig, open the console by pressing Ctrl+Alt+~ and then type "timedemo demo1."

*Doom 3* faster than an AGP-based system?

**PCI Express should make no notable difference.**

**4** Does *Doom 3* run better on video cards with 256MB of video memory rather than 128MB? If so, is the difference a big one? What can a person with 128MB of video memory do to improve performance? What sorts of details should they turn down first?

**The more video memory, the better. On 64MB video cards, we have to downsize certain classes of textures to get them to fit. On 128MB video cards, we run everything at full resolution but use compressed textures. On 256MB video cards, we run with compressed diffuse and specular textures and uncompressed normal maps. In Ultra Quality, everything is uncompressed but most levels require about 500MB of texture memory, so we don't enable this setup by default on any currently shipping video card.**

***Doom 3* automatically chooses the best options to use and run well, and someone with a 128MB (or even a 64MB) video card will get great visuals and good performance right out of the box.**

Translation: They've made the thing idiot-proof. Sweet!

**5** Given a 32-bit Windows environment, how much RAM should a gamer have in his PC if he wants to see *Doom 3* running at its best? Should that same gamer go for more RAM if he switches to 64-bit Windows?

**512MB RAM is ideal, and if you're trying to run the game in Ultra Quality, you'll want 1GB RAM or more. We don't do anything specifically for a 64-bit OS.**

**6** So, regardless of which OS he's using, what's the least amount of system RAM a fella should have if he wants to have a good *Doom 3* experience?

**384MB RAM, although 512MB RAM is highly recommended.**

**7** Same question, but regarding one's CPU: What's the least amount of CPU horsepower a person should have if he wants to have a good *Doom 3* experience?

**A 1.5GHz P4 or the AMD equivalent (e.g., an Athlon 1500+).**

Translation: *Doom 3* relies much more heavily on your video card than on your CPU. But because most other modern games require considerably more CPU horsepower, it's wise to go higher than this minimum spec if you can afford to.

**8** Is it true that *Doom 3's* audio engine is entirely CPU-dependent, thus negating the benefits of high-end sound cards? If so, what are the benefits? What are the drawbacks?

**Yes, we do all sound-mixing in the *Doom 3* engine and don't rely on high-end audio hardware to help out with this aspect. Moving it over to the audio card would have a negligible benefit, as our current sound-mixing takes up only a few percent of the CPU.**

**The benefit is that we run the same code-path on all systems. The only drawback is that we run the sound engine in a separate thread, and keeping up with sound-synchronization issues has at times been a bit of a headache.**

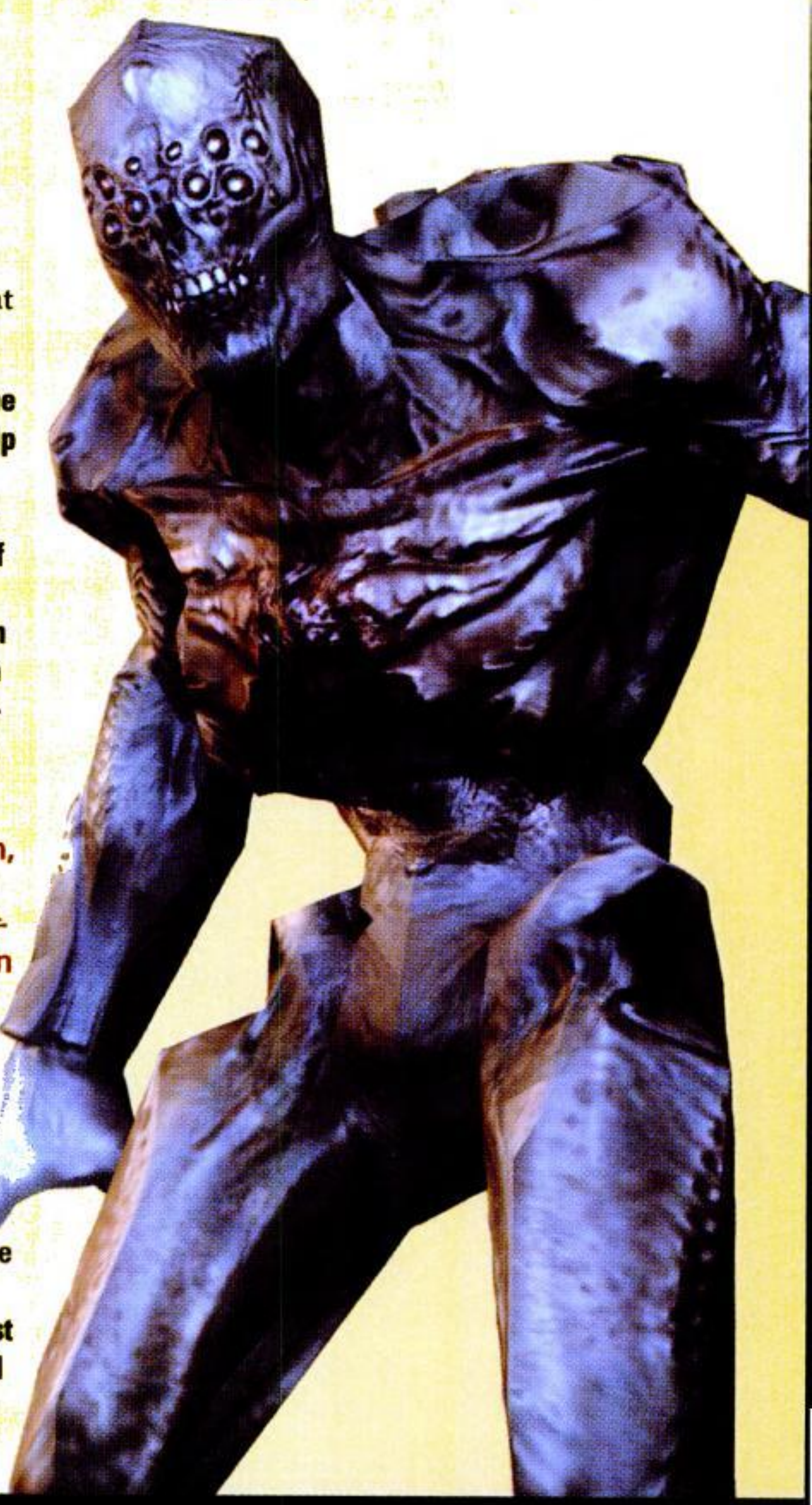
Translation: Much to Creative Labs' chagrin, *Doom 3* should sound exactly the same (and perform equally well) on your motherboard's built-in audio processor as it will on a high-end Audigy 2 ZS sound card.

**9** If you want *Doom 3* to look as good as possible on your PC, but also want to boost frame-rates a bit, which options should you decrease in quality first?

**The only thing that comes to mind is to disable the advanced special effects, which turns off fragment program support. Apart from that, there's just not much to disable that doesn't affect the overall look of the game.**

Translation: If *Doom 3* runs slowly on your system, and you'd like it to run faster while maintaining all of its Doomy-ness and gloominess, you may have to bite the bullet and upgrade. See our sidebar below for upgrade tips.

*(This story is excerpted from a feature that ran in the September 2004 issue of PC Gamer, a sister publication of Maximum PC.)*



## VIDEOCARD TESTS

| | |
|---|---|
| GeForce 6800 Ultra (1280x1024 HQ) | 81.1 fps |
| Radeon 9800 XT (1280x1024 HQ) | 33.0 fps |
| GeForce4 Ti 4600 (800x600 MQ) | 30.0 fps |
| GeForce4 MX 460 (640x480 LQ) | 13.4 fps |

As you can see, there's a huge performance difference between the old, fixed-function GeForce4 MX card and the state-of-the-art 6800 Ultra. Not only do you get a massive performance increase, you also run at a much higher quality level, with high-resolution textures and much more nuanced shadows. The Radeon 9800 XT performed well, but the eight-pipeline card couldn't keep up with the 16-pipe 6800.

## CPU TESTS

| | |
|---|---|
| Athlon FX-51 | 81.0 fps |
| Athlon XP 3200 | 64.4 fps |
| Pentium 4 2.0GHz | 33.4 fps |

The results of the CPU tests are quite surprising. The Athlon XP—an underperformer by today's standards—performs admirably. It's able to keep up with the CPU-heavy physics and sound engines, unlike the slow 2GHz Pentium 4 we tested.

## SYSTEM TESTS

| | |
|---|---|
| Athlon FX-51, GeForce 6800 Ultra | 81.0 fps |
| Athlon XP 3200, Radeon 9800 Pro 256MB | 48.8 fps |
| Pentium 4 2GHz, GeForce3 Ti 500 | 25.1 fps |

What's surprising is that the high-end system is nearly twice as fast as the midrange rig. The lesson is one *Maximum PC* has preached for years: New hardware gives you a huge performance boost, even compared with a system that's only about a year old.

This means that, in order to get the most *Doom 3* performance for your buck, you should: upgrade your videocard first, your CPU second, and your memory third. You should also remember that pairing an uber-powerful videocard with a slow-ass CPU will limit your in-game performance, although not as much as we would have expected.

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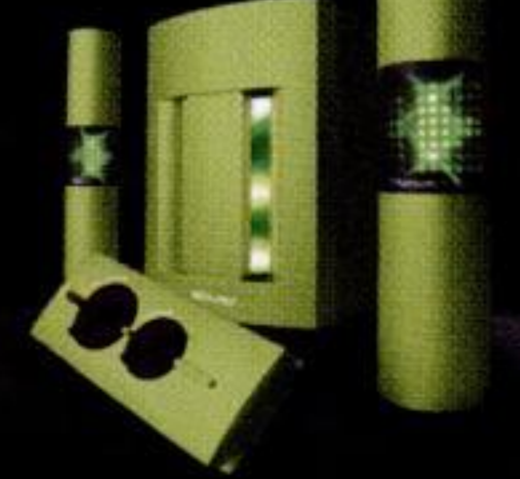

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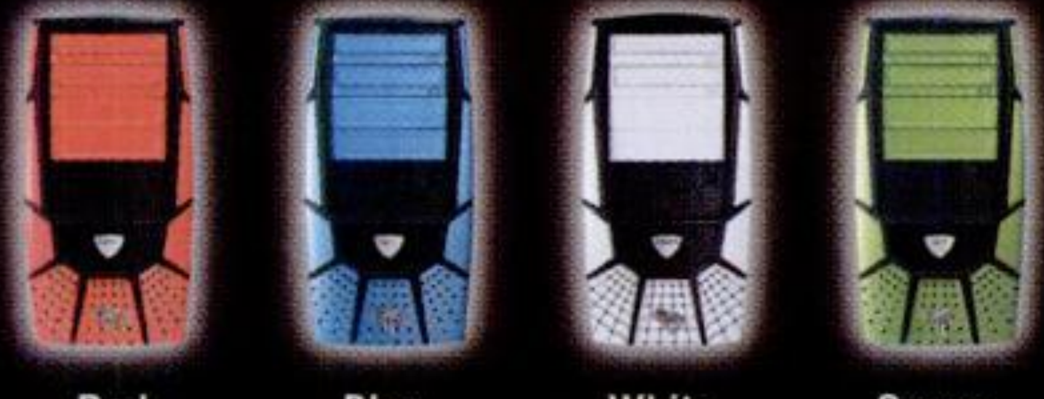

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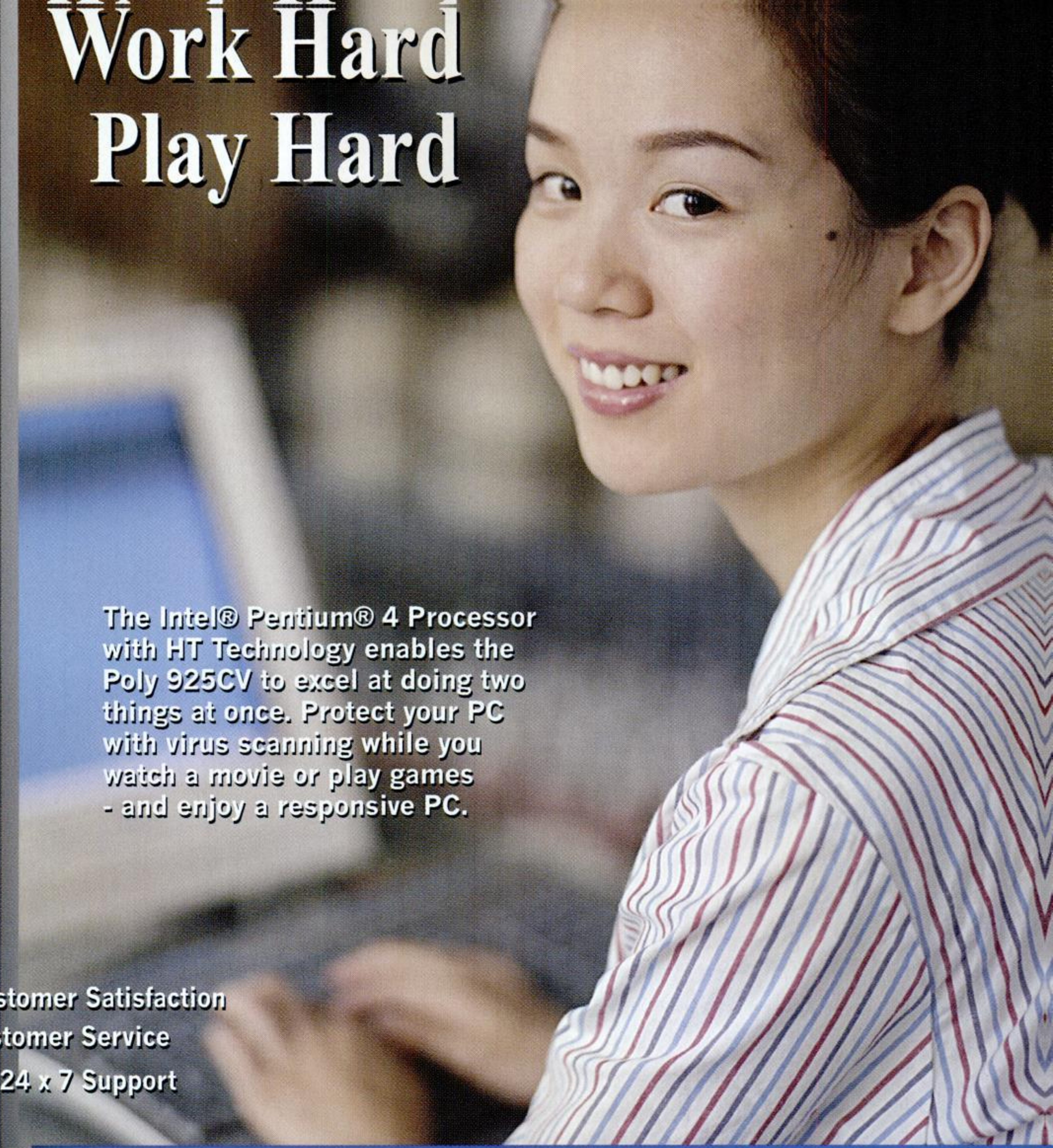

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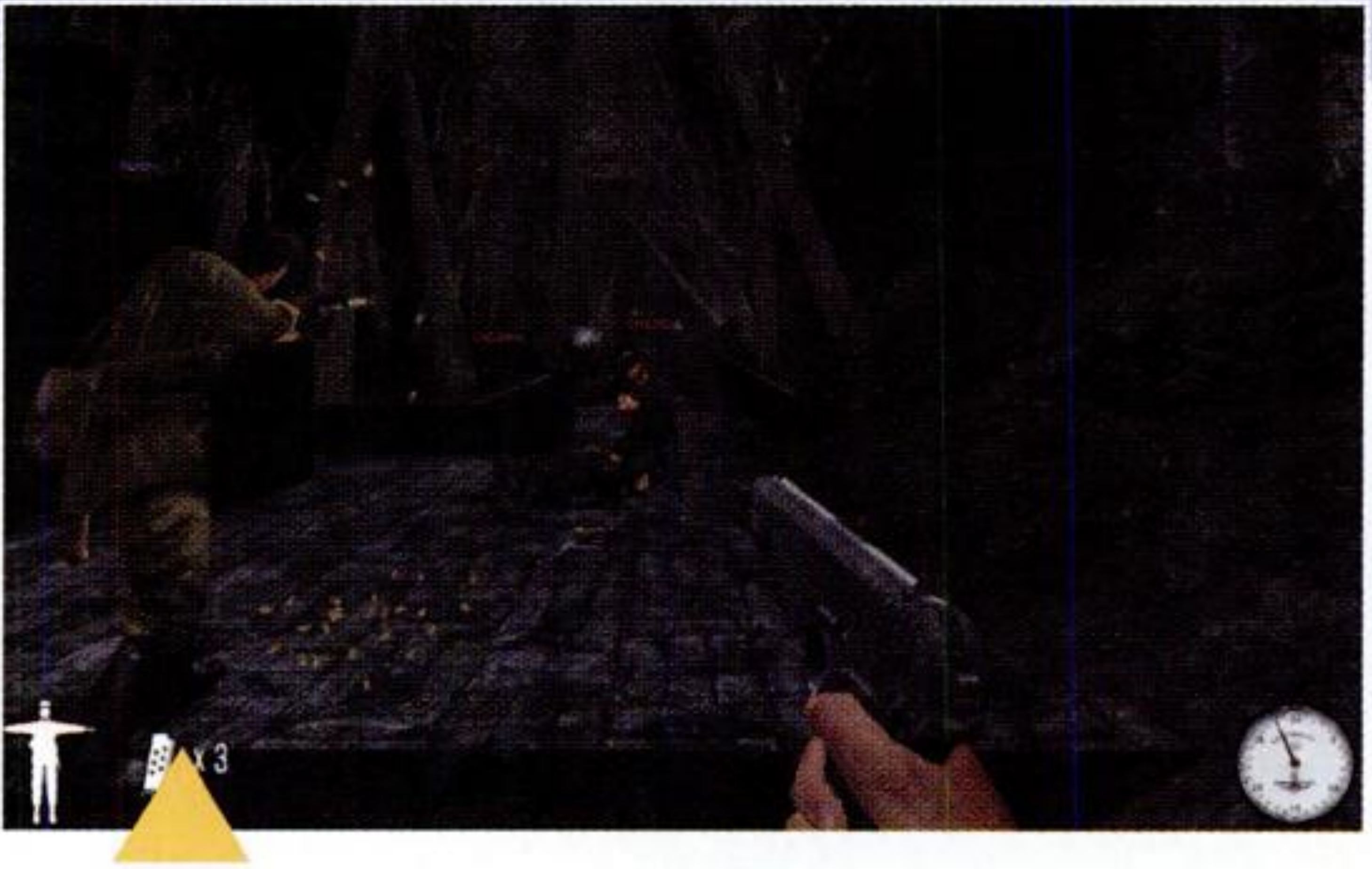
# Marvelous Mods

**Tore through that game you picked up last Tuesday? Extend its lifespan with one of our Baker's Dozen of top mods — absolutely free!**

So you've triumphed over *Morrowind.* You've sent the last guy in *Unreal Tournament 2004* crying home to mommy. What's next?

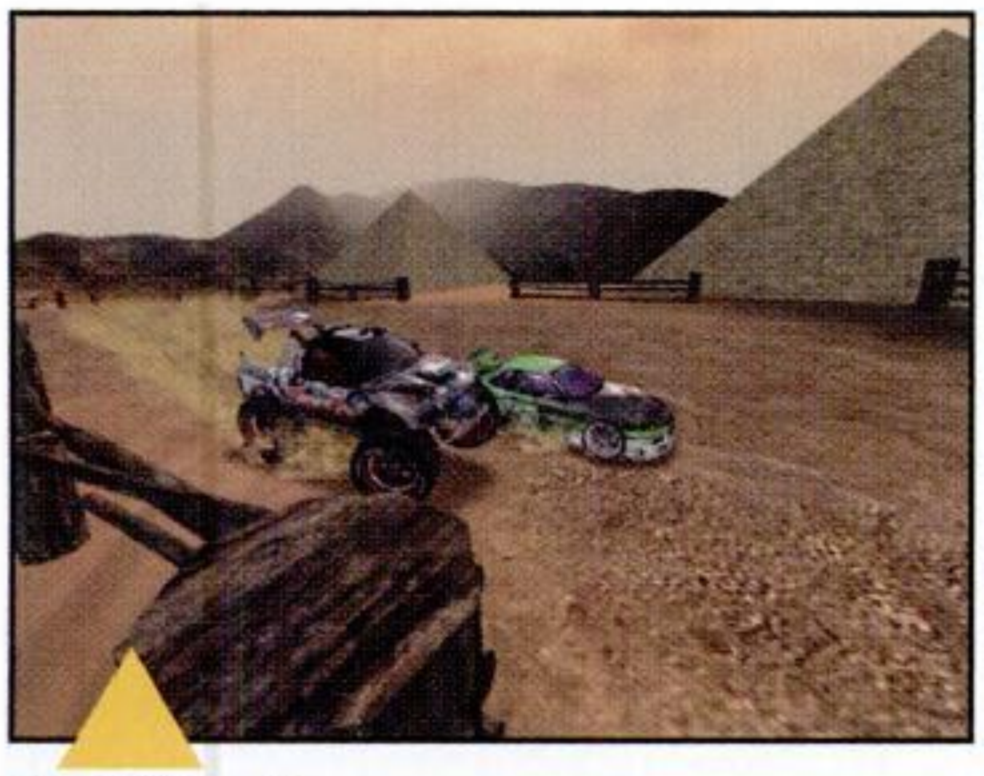
Don't relegate that CD-ROM to "coaster" status just yet. Your very good friends in the amateur mod community have been hard at work cranking out new adventures—poking and prodding that 3D game engine in ways the developers never imagined. The hottest game to mod at press time was *Unreal Tournament 2004*, but with the recent release of editing tools for *Far Cry*, the retail release of *Doom 3*, and—hopefully—*Half-life 2* about to hit shelves, you can bet a deluge of awesome mods, tweaks, and hacks for those games is on the way as well.

With so many mods available—many of them too rough and "amateurish" to bother with—it's tough to know just where to start. Not to worry: Maximum PC has done the dirty work for you and sifted through hundreds of user-created mods to bring you this baker's dozen, which represent the current cream of the mod crop.



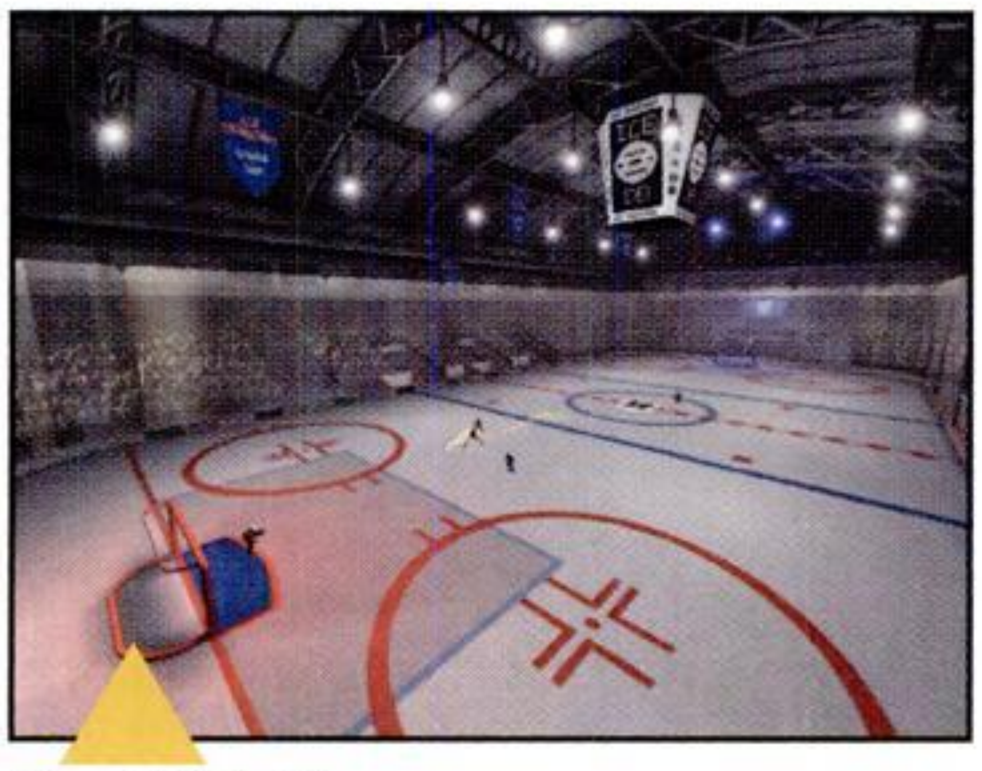
### Red Orchestra

**Web Site:** www.redorchestramod.com
**For:** *Unreal Tournament 2004*
**Description:** Currently at v2.1, Red Orchestra is a massive modification that takes *UT2004* to the war-torn battlefields of WWII. A finalist for Best FPS Mod in the Make Something Unreal Contest (put on by Epic and NVIDIA), it gives UT's graphics and gameplay a complete makeover.



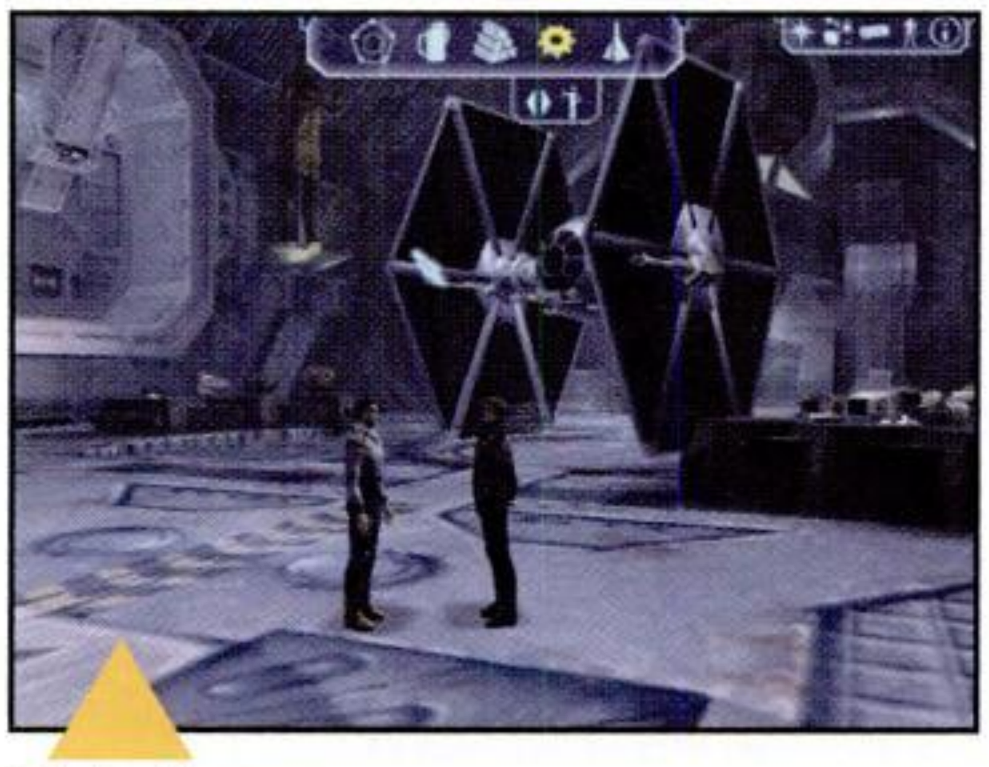
### UnWheel

**Web Site:** http://unwheel.beyondunreal.com/
**For:** *Unreal Tournament 2004*
**Description:** A finalist for Best Non-FPS Mod in the Make Something Unreal contest, UnWheel transforms *UT2004* into a fast-paced racing game that puts you behind the wheel of sports cars, monster trucks, rally cars, and a few oddball vehicles. Race laps or play specialty modes like Capture The Flag or King of the Hill. You've gotta see this one for yourself!



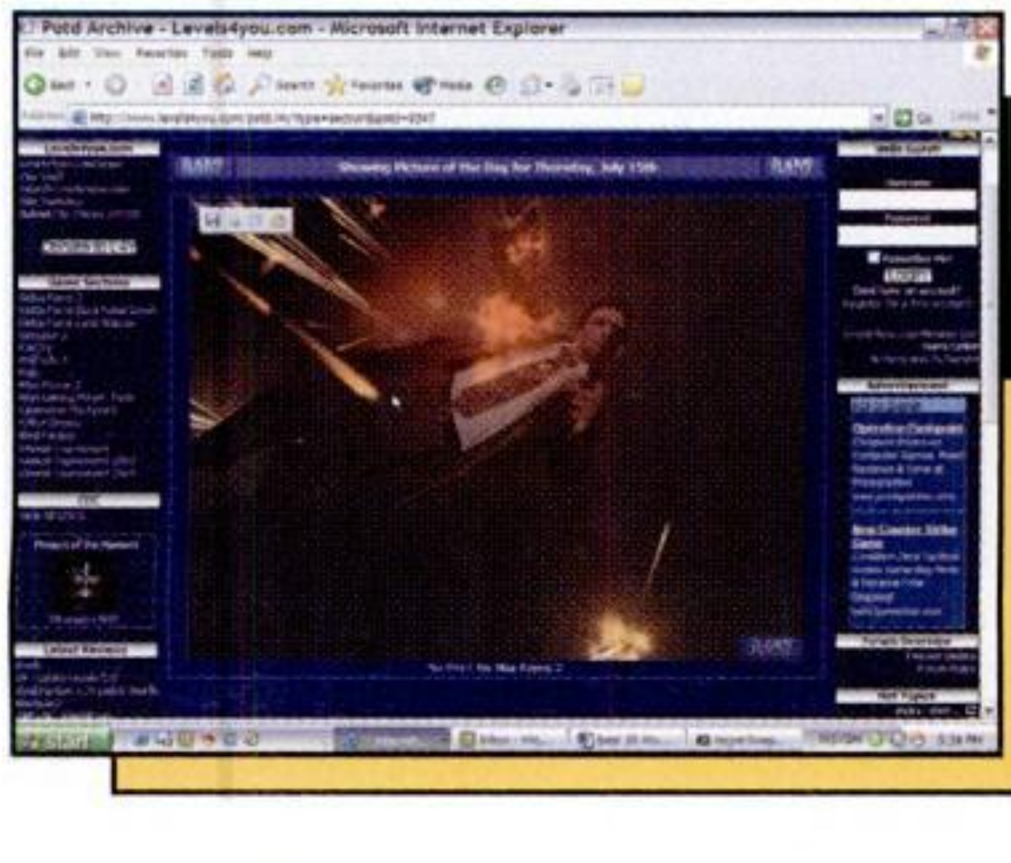
### DeathBall

**Web Site:** www.deathball.net
**For:** *Unreal Tournament 2004*
**Description:** Take soccer, rugby, handball, and the *UT2004* engine; blend it all up into a frothy mixture; and you just might end up with DeathBall, a unique sports modification totally unlike any athletic competition you've ever seen. Perfect for teamplay, each side has room for five players...and a whole lot of smack-talk!



### Rebalance

**Web Site:** www.rebalancemod.com
**For:** *Freelancer*
**Description:** If you've ever dreamed about matching a *Star Wars* TIE Fighter up against one of *Wing Commander's* Panther ships, then this is for you. It adds dozens of new ships from just about every science fiction movie, TV show, and game to the *Freelancer* universe for use in both single and multiplayer games. (Be sure to download and install FL Mod Manager first, also at Rebalancemod.com.)



## *Top Mod Resources*

***Wondering where to find the latest mods on the web? Check out these sites.***

**Levels 4 You**
www.levels4you.com/

**Mod Database**
www.moddb.com

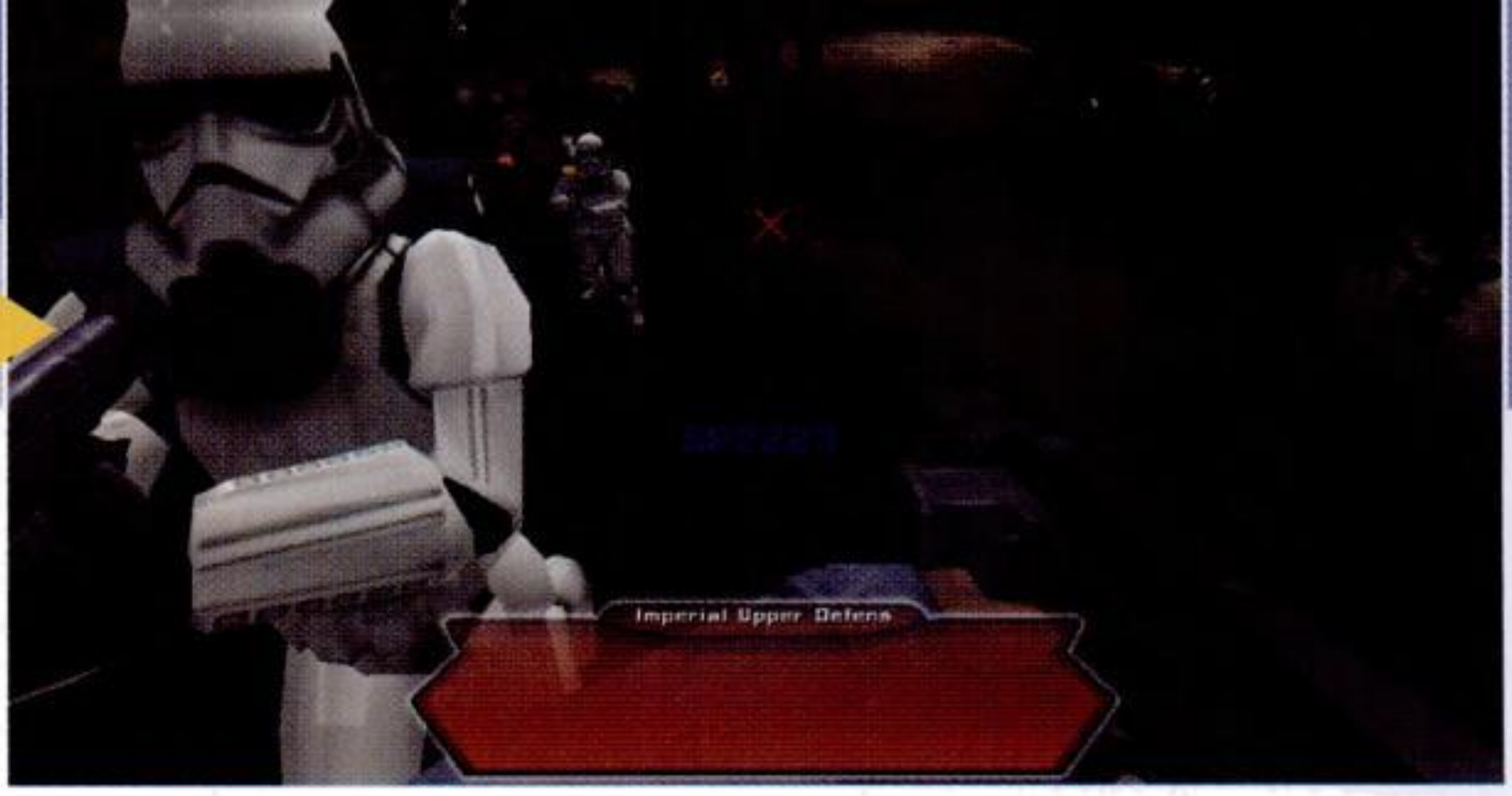
**FilePlanet**
www.fileplanet.com

**Total Conversions.com**
www.totalconversions.com

# The Best 3D Mods

## Troopers: Dawn of Destiny

**Web Site:** www.ut2004troopers.com
**For:** *Unreal Tournament 2004*
**Description:** Shhh...don't tell George Lucas, but Troopers is a first-rate *Star Wars* mod that places you in the white armored booties of a Stormtrooper (or a Rebel scum, if you're feeling scummy). Fight amidst the lush greenery of Endor, the icy wasteland of Hoth, onboard the Death Star, or in several other sci-fi locales. But it's our little secret, okay?



## Alien Swarm

**Web Site:** www.blackcatgames.com/swarm/
**For:** *Unreal Tournament 2004*
**Description:** Remember that old top-down-perspective arcade alien shooter *Xenophobia*? *Alien Swarm* is its modern day offspring, totally converting the *UT2K4* graphics engine into an all-new play experience. In both single- and multiplayer modes, you play as a Space Marine aboard an alien-infested space station, shooting up and burning bugs with an extensive arsenal of sci-fi weaponry.

## Chaos UT2: Evolution

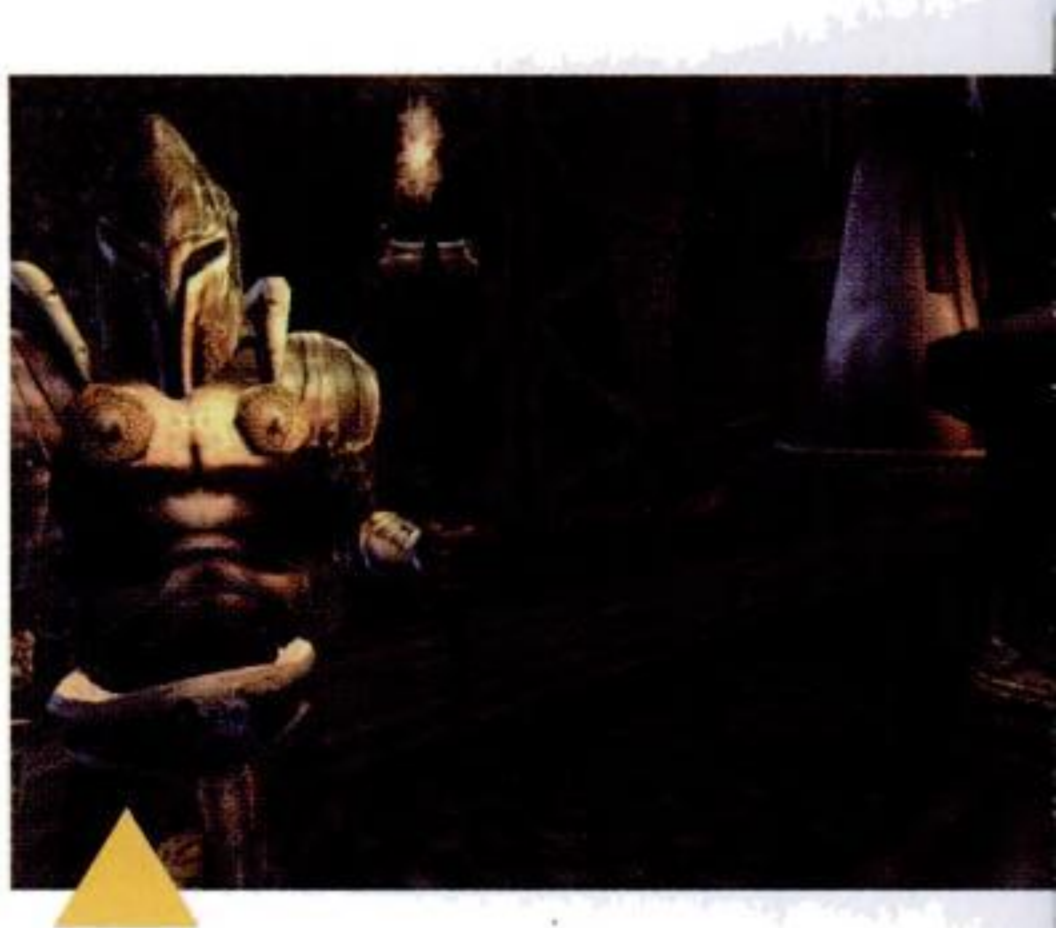
**Web Site:** http://dynamic4.gamespy.com/~chaotic/index.php
**For:** *Unreal Tournament 2004*
**Description:** Chaos UT2 is the latest in a long line of increasingly more spectacular Chaos modifications for well-known shooters, and they've been around since *Quake II*. Cramming in tons of new weapons, levels, tools, moves, and much more, this mod will make that tired old game of *UT* come alive again.

## Giants Ultimate

**Web Site:** http://pumaman.zftp.com/pumamods.html
**For:** *The Elder Scrolls III: Morrowind*
**Description:** One of the most downloaded modifications for roleplaying giant *Morrowind*, Giants Ultimate adds over 150 new creature models to the game-including (duh!) giants, dragons, vampires, zombies, mummies, demons, golems, nymphs, and phantasms. This mod will work with any version of *Morrowind*, but certain features will be available only with the game's retail expansion packs.

## Shattered Oasis

**Web Site:** www.shatteredoasis.jolt.co.uk/
**For:** *Unreal Tournament 2004*
**Description:** In this post-apocalyptic-future mod, two sides square off for control of the Earth. The Compounders are peaceniks driven by a live-and-let-live philosophy and technological comfort; the Variants are a poor, but brutal, people that live to assimilate other races. That's probably what led to a post-apocalyptic future in the first place.



## Sea of Destiny Complete

**Web Site:** www.rpgplanet.com/morrowind/sodp/
**For:** *The Elder Scrolls III: Morrowind*
**Description:** This ambitious mod (and its sequel, SoD: Frost Fall) is a fully-loaded delight that gives you a dozen new islands, 300 new characters to meet, extra armor, more clothing, and exciting new quests to expand your *Morrowind* experience. Sea of Destiny does require the Tribunal expansion, so make sure that's installed first.

# *The Future Is Mod*

### *It's never too early to start thinking about the next Mods!*

The original *Half-life* is one of the most "modded" games of all-time, spawning some immensely popular adaptations, including *Counter-Strike* and *Team Fortress Classic*. The long-awaited sequel may just be seeing the light of day (hopefully), but that hasn't stopped mod-makers from planning next year's crop of killer add-ons for what will likely be another gaming classic. Here's a few that we think have a lot of potential for sucking up even more of our time.

FARCRY
2
JEDI: TIMELINE
A HALF-LIFE 2 AND FARCRY MOD

***Entropy for Half-Life 2*** (www.entropy-mod.com) — A massively multiplayer online gang war fought with vehicles.

***Jedi Timeline for Half-Life 2/Far Cry*** (www.jeditimeline.com) — A shooter spanning *Star Wars* history from the Sith Era to the New Jedi Order.

***Crisis 51 for Half-Life 2*** (http://crisis51.hl2db.com/) — A gripping original story about a terrorist strike on Area 51.

***No More Room in Hell for Half-Life 2*** (www.nomoreroominhell.com/) — Crazy flesh-eating zombies. Need we say more?

***Half-Life Mobsters for Half-Life 2*** (http://hlmobsters.jolt.co.uk/) — Team-based Cops & Robbers set during the gangland shooting heyday of 1930s Chicago.

### Blitzkrieg 2

**Web Site:** www.derelictstudios.net/blitz2/
**For:** *C&C: Generals*
**Description:** The team that created the original Blitzkrieg total conversion for *Red Alert 2* return, remaking *C&C: Generals*' real-time strategy action into a World War II conflict between the Allies, Germany, and Russia. Even better, the mod isn't finished: a second release is in the works, which should include planes and super-weapons. A fourth playable side, Japan, may come later.

### Dead Cities

**Web Site:** http://dynamic6.gamespy.com/~deadcities/
**For:** *Battlefield 1942*
**Description:** In the near future, roving bands of thugs have run amuck. The world has been ravaged by war, and two groups — the Road Rogues and the Civilian Compound — battle for survival and supremacy. Get behind the wheel of a dune buggy, pilot a gyro copter, or control any of up to six vehicles in Dead Cities, a mod that transforms *Battlefield 1942* into a game of bleak post-modern warfare.

### Max Payne 2 Cinema Mod

**Web Site:** www.paynereactor.com/modifications-mp2-tweaks.htm
**For:** *Max Payne 2*
**Description:** Now up to v2.0, the Cinema Mod for *Max Payne 2* puts a new coat of paint on this bloody tale of revenge. The characters have undergone makeovers; there are new blood and weapon effects; you can non-lethally disarm enemies; and a host of new guns will satisfy nearly any taste in mayhem. Think Max played like film noir before? You haven't seen anything yet.

# Modding's 10 Commandments

## By Cliff Bleszinski, Epic Games

*Think you've got what it takes to craft a mod of your very own? Heed the wisdom of Cliff Bleszinski, level designer extraordinaire for the Unreal series, as he explains the do's and don'ts of mod success. As Governor Arnold Schwarzenegger would say: "Dooh Ett!"*

***1. FIRST, understand the game/franchise.*** *If you're making a level for Unreal Tournament and you come from the Counter-Strike community, it probably will help your level if you play a whole hell of a lot of UT and understand how the game balances. Otherwise you're going to be trying to force a square peg into a round hole and we all know how that story ends.*

***2. Know when to plan, know when to improvise.*** *Bad ideas are a dime a dozen, good ideas are far more rare. Start with a core concept — "It's a junkyard... in space!" — and go from there.*

***3. Designer, assess thyself.*** *Know the limits of your own abilities as an artist and, when necessary, focus on design over art. Many designers allow their limited art ability to dictate the kind of content and level they build.*

***4. Seek criticism.*** *Surround yourself with other talented designers and leverage their abilities and opinions on a regular basis.*

***5. Remember to Play.*** *It sounds silly, it seems obvious, but I can't help but point it out — make sure you make time for other games. Many designers forget that, in order to make great games, you have to understand where the business is at any given point.*

***6. Visuals vs. gameplay.*** *When creating an environment's lighting and textures, it is **crucial** that enemies remain visible against their backdrop.*

***7. The Grid is Your Friend.*** *Architects keep their work clean and on a grid — as should you! A grid helps keep your level visually tight and intact.*

***8. Mr. Carrot, meet Mr. Stick.*** *Making a good shooter level is like hosting a good house party – in one room you want the food, in another you want the drinks, and in yet another you want the Karaoke. Keep your "guests" moving with goodies!*

***9. Stick to the rules.*** *All good games have a set standard of rules that they adhere to for minimum door height, step height, etc. These rules exist for a reason – to create a clear visual language for the player, so that he may learn and then exploit these rules for fun and profit.*

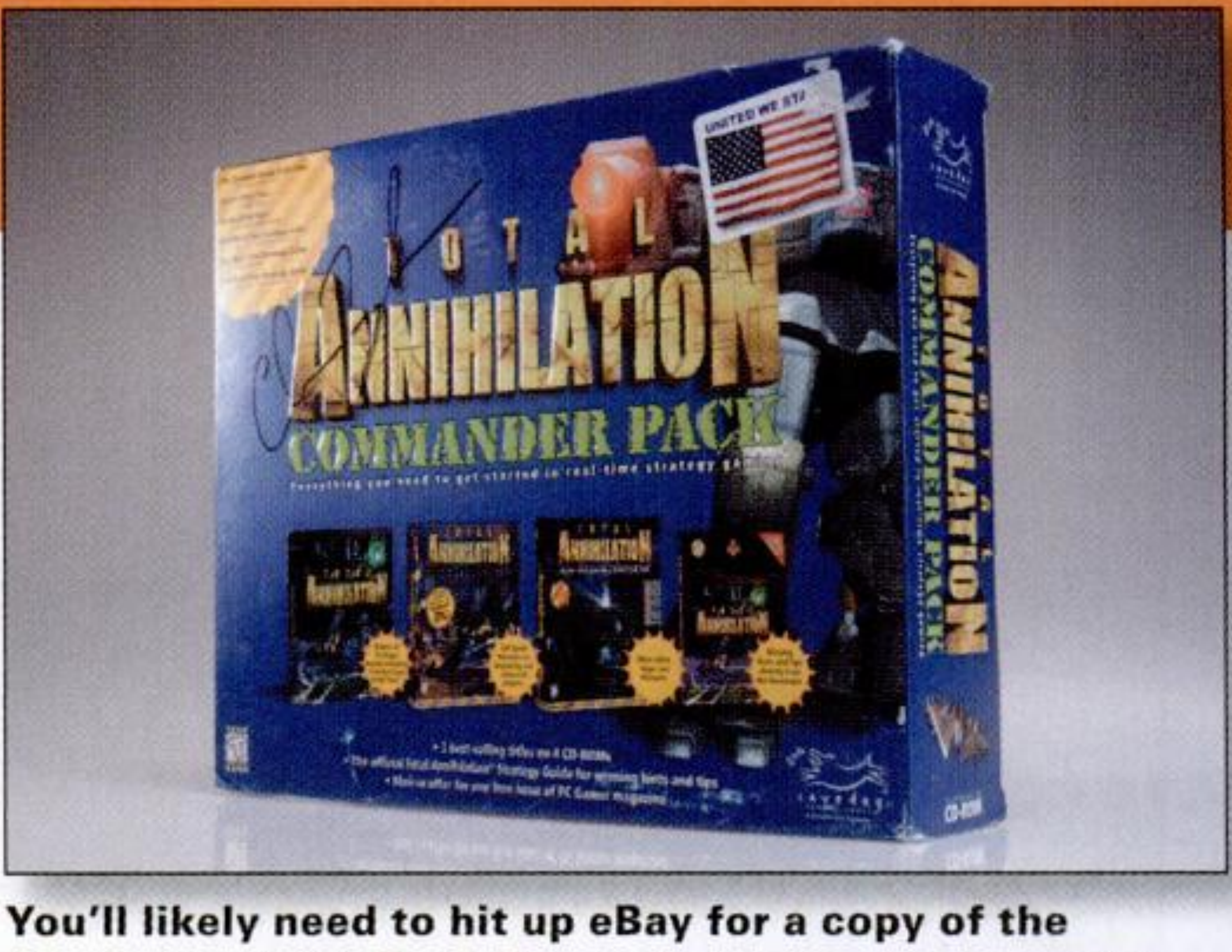
***10. Don't give up!*** *In the immortal words of Aerosmith, "You've got to lose to know how to win." I made a lot of horrible, god-awful levels before I got around to making the classic "DM-Curse." We learn balance by falling, after all.* ■

# Collectible 3D Games

## There's gold in them there old game boxes!

If you've been gaming long enough to know what a 3Dfx board is, it's likely that—like most of us here at *Maximum PC*—you've accumulated a massive number of 3D games. However, before you trim your collection, do some research about the potential value of what you're getting rid of—the value of some "vintage" games may surprise you. (eBay's a good resource.)

Here's a look at two of the most valuable collectible PC games we've seen yet; Origin Systems *The Kilrathi Saga*, and id Software's vaunted *id Anthology*, each of which can go for more than $300 on eBay in pristine condition. Zoiks! (If you own these, you can now tell your wife or significant other that your "collection" is actually your retirement plan or your kid's college fund.) ■



**You'll likely need to hit up eBay for a copy of the *TA: Commander Pack*. Pawn shops are also potential gold mines, as are sites such as www.rochnet.net.**

WING COMMANDER
KILRATHI saga
Relive the adventure!
Windows 95
SAGA

### The Kilrathi Saga

This compilation of the first three *Wing Commander* games (DOS-based) was optimized to run under Win 95 and tweaked for fast computers. It was also produced in limited quantities (reportedly 20,000 copies were published). These features, coupled with *Wing Commander's* popularity and Origin's demise have made *The Kilrathi Saga* a highly sought-after "vintage" game collectible. The CDs are nicely repackaged with artwork on the spines, and a patch that will enable *Wing Commander IV* to run under Windows (Win XP in compatibility mode) is also included.

You rookies'll be flying with experienced pilots on your first missions.

***Wing Commander I* looks dated, but its gameplay still holds up—particularly when you consider the current dearth of space combat sims.**

### id Anthology

Truly special collector's editions are becoming scarce these days, as competition for retail space is heavy and retailers don't want to make room for additional SKUs, even for hot titles. The absence of a collector's version of *Doom 3* is notable, for instance. But id did release, via publisher GT Interactive, one of the most impressive limited release compilations of all time in 1997, the *id Anthology*. The over-sized box contained a *Doom* comic, T-shirt, the "book of id," a pewter Cyberdemon, dog tags, phone card, and a 4-disc catalog of every game id made from *Commander Keen* through *Quake*—more than 20 games in all.

THE BOOK OF id
anthology

**The *id Anthology* is one of the most well-conceived and -executed collector's editions of all time.**

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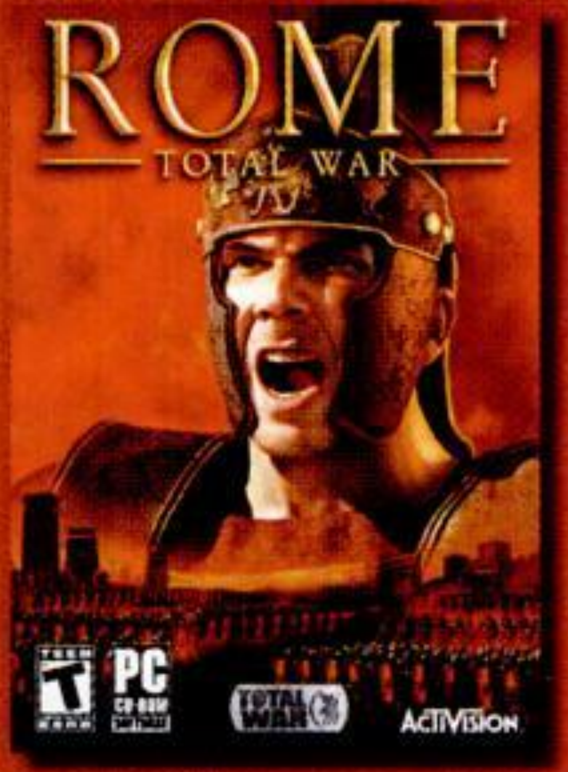

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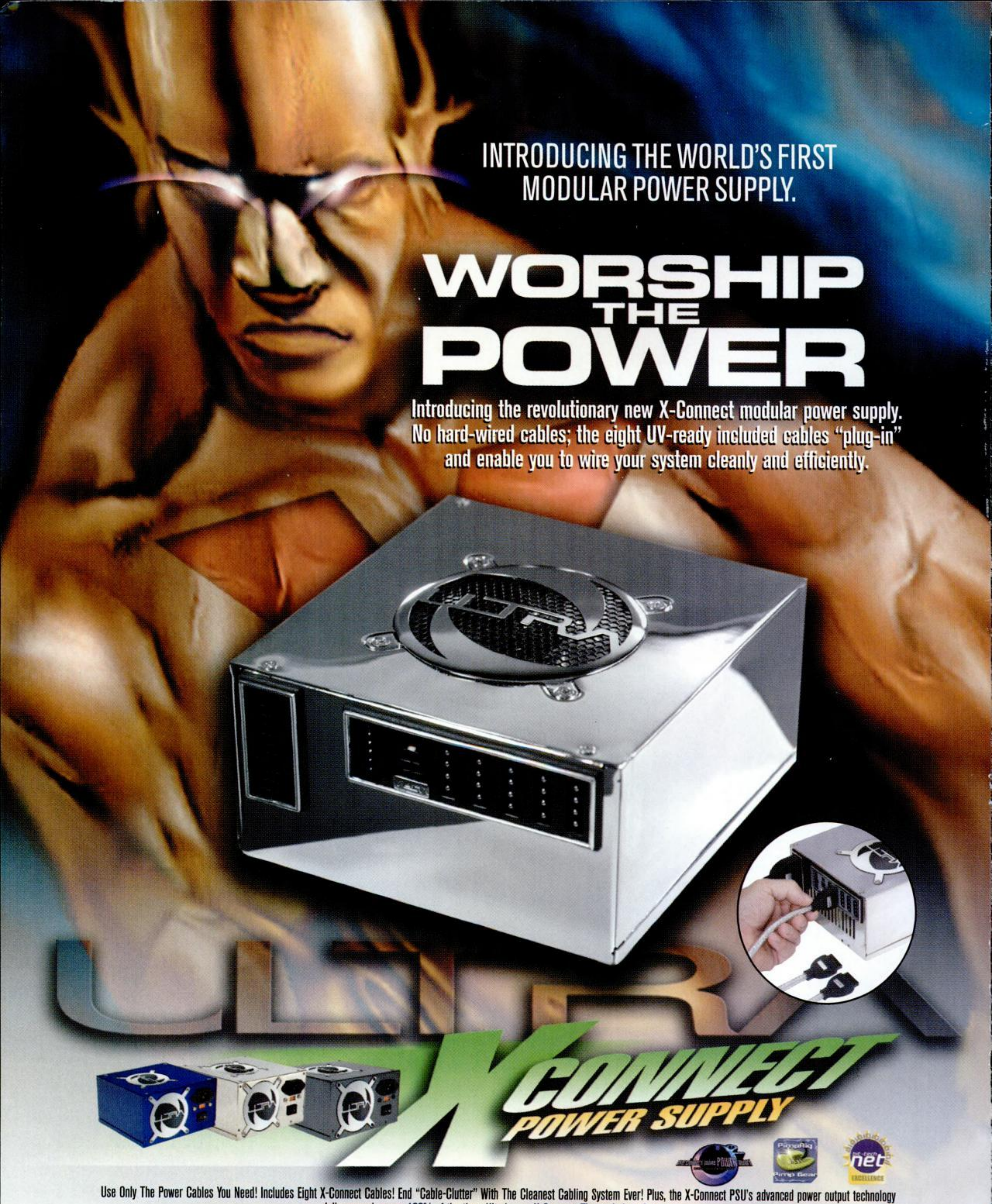

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